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The Domestic Opportunity

EXACTLY ten years ago, shortly after the general strike of 1926, we published the first Annual Domestic Issue of the ELECTRICAL REVIEW.

Shortage of coal supplies induced, or shall we say compelled, large numbers of householders up and down the country to change over, in the autumn and winter of that year, from the coal fire to the electric for, at least, part of the service of the home. Domestic electrification matters were beginning to occupy a leading place in the electrical industry, and one required only an average imagination to foresee the great expansion that was sure to come before long. 1926 was the year of the great E.D.A. campaign "Wiring the Homes of Britain," and the number of new consumers connected in the two years immediately following nearly equalled the number connected in the preceding forty years!

Each of the ten years has witnessed substantial advance, but there has always remained the prospect of better things to come. We suppose that at the present time we are on a wave of progress bigger far than any that has yet carried us on the way to our objective.

Yet, notwithstanding all our past and present campaigns, there are serious observers amongst us who hold that we might be making far more rapid headway if we were availing ourselves fully of our opportunities. This view is expressed by the contributor who, on a later page, asks: "Are we Doing our Best?"

This ever-increasing importance of domestic electrical applications and the larger number and variety of appliances and devices connected with the business, have fully justified the practice begun by us in 1926 and its continuance in the month of October down to date. The number of the ELECTRICAL REVIEW now before the reader is the eleventh Annual Domestic Issue and a comparison of what was happening in 1926 and 1936 forms an encouraging study.

The main editorial purpose has been to bring together as representative a collection as possible of electric fires, cooking appliances, lighting fittings and devices, water-heating systems, labour-saving devices, installation material and so forth that manufacturers and traders have placed on the market for the 1936-1937 season. Improvements that have been introduced are indicated and the great mass of appliances and apparatus always in demand also have their place.

We hope that, as in the past, the material thus brought together will be of service to supply engineers, contractors, wholesalers, ironmongers and other retailers, not forgetting sales engineers and managers, canvassers and showroom staff men and women who demonstrate the merits of such products to potential consumers.

The anticipations of the year 1926 and those expressed here from year to year have been more than realised. The building of new house and flat property proceeds apace and electricity is in demand for such, but as we think of the vast number of homes where electric cooking, water heating and other services are not yet installed we dream dreams of what will have come to pass when from the year 1946 we are able to look back upon the "Million More" campaign of 1936.

The Lowest Tender

"OTHER things being equal, acceptance of the lowest tender is a natural corollary of the system in use. But other things are not necessarily equal. . . . ." These very sound words are a quotation from Shakespeare—not our Immortal Bard, but Mr. Shakespeare, M.P., who used them in the course of a reply to a question addressed to the Minister of Health in Parliament at the end of July, just as everybody was

thinking about holidays. It may seem a pity that a public pronouncement on this familiar lowest tender controversy should have been made at such a time, but it must not receive less publicity on that account. Municipal authorities, including especially electrical engineers and their committees, who have to recommend tenders for technical equipment for acceptance, may often act against the best interests of the undertaking, and therefore of the ratepayers, as well as unfairly towards some of the tenderers, if they follow any rigid resolution to accept the lowest offer at all costs. The question is hoary with age, but it was, nevertheless, all to the good that when asked by Mr. Duncan, on July 28th, it brought so clear a statement from Mr. Shakespeare. Mr. Duncan had in mind the familiar Circular 1388, issued in 1934, with reference to Standing Orders relating to contracts (Local Government Act, 1933, Section 266). He wanted to know whether it was intended to tell local authorities that, in considering tenders for public works, the lowest tendered price must always be accepted without regard to any other factors. The reply was a very definite negative, followed by the sentence with which this leaderette opens. Certainly, as most engineers, committeemen and manufacturers know full well, very often other things are *not* necessarily equal. "Regard must be paid to other criteria than tendered price." The Minister of Health's view is that it is important that efficiency, running cost, durability of materials, freedom from the necessity for repair and attention and suitability for the purpose in view, should be considered as well as price, while the technical qualifications and financial standing of the contractor are also factors which should receive due weight. It seems to us that no clearer and more reasonable statement of the subject could be made, but we are not unmindful of the fact that the ability to make a judicial evaluation of the "other criteria" is not to be found everywhere.

Domestic Electricity in the States

ATTEMPTS are frequently made to hold up the people of the United States as shining examples for domestic electricity consumers in this country, but more and more we are convinced that conditions and ideas in the two countries are so different that useful comparison is well-nigh impossible. A recent survey of the American domestic field made by the *Electrical World* (New York) reveals some of these differences. The major appliances used in the States are refrigerators, water heaters, vacuum cleaners, clothes washers, and ranges (cookers). The "saturation" for refrigerators is given as 36 per cent., whereas it would be safe to say that it is certainly not more than 1 per cent. here. The difference is even more marked in the case of clothes washers, a saturation figure of 54 per cent. being given. In this country, while wash-boilers are quite common, clothes *washers* are a rarity. Sixty-two per cent. for vacuum cleaners is well above the corresponding proportion for Great Britain. On the other hand, electric cookers (shown at 11 per cent.) do not seem to have caught on in the United States and we should soon beat them in this at least, if we have not already done so. Electric fires appear to be so little employed in the United States that they are not worth mentioning separately, while water heaters are only shown at 4 per cent. There, again, we would seem to be in the lead.

Electricity Supply Staffs

THE effect of various reorganisation schemes in the electricity supply industry on the prospects of the technical staffs was, naturally, a background to many speeches at the E.P.E.A. annual dinner. While such changes in themselves might have reduced the number of men required, the very rapidity of development that has brought them about is providing a corrective. Thus the total of those engaged in electricity supply in 1934-35 (80,800) was about 6,000 more than in 1933-34, the accelerating rate of employment being shown by the lesser increase of 4,400 and 2,500 in the previous two years. The number engaged in generation, however, has actually declined during recent years and adaptation in other directions also has been, and will be, necessary. In meeting the situation, the National and District Joint Boards, the value of which in the seventeen years of their existence was quite evidently recognised by both sides, should be of great help. In finding happy solutions of such difficulties as have arisen, to quote Mr. J. F. Sarvent (the E.P.E.A. president), the work of the N.J.B. has tended towards an ideal for which men have long striven. It is, we believe, not only the machinery of the joint boards that is likely to be efficacious to this end, but also the spirit of mutual understanding that has been engendered by them.

Studying Short-circuits

ALTHOUGH the three firms that have pooled their technical experience under the title of Switchgear Testing, Ltd., were formerly able to use information derived from many sources for assigning practically accurate ratings to their circuit-breakers, the building of a testing station at Old Trafford (described in this issue) must be regarded as a big step forward. The station has been designed to reproduce the worst conditions occurring in a modern supply network and to enable permanent records to be made of short-circuit phenomena. To many engineers, therefore, the chief interest will lie in the equipment for measuring and recording what happens when a circuit-breaker opens under fault conditions. The sixteen-unit electromagnetic oscillograph and restriking-voltage indicator are said to be the only examples of their kind in the world. As the former cannot, however, give adequate records of the restriking voltage owing to the high frequency of the transient, it is supplemented by a cathode-ray oscillograph by which the important section (lasting only 0.0001 sec.) of the recovery voltage is very greatly drawn out on a photographic film, so that it can be studied in detail and the wave front slope measured. It is to the skill acquired in the interpretation of such records at the testing stations of manufacturers that we must look for major switchgear developments in the future.

The Whitley Illuminations

IT seems strange at a time when Blackpool is attracting half a million visitors in a week-end by its illuminations; a quarter of a million people pay to see the picturesque lighting in Roker Park, Sunderland, in a fortnight; and trade is brought to scores of other towns through the medium of light, that councillors at Whitley and Monkseaton should have to appeal to the Minister of Health against a decision of the district auditor to surcharge them for voting for illuminations last year. Yet the auditor, while holding that the expenditure incurred was illegal, agreed with a submission that it was the Council's duty to illuminate the Lower Promenade on the grounds that it was authorised to do so as an entertainment. He would not agree, though, that the illuminations were a form of advertisement, and were therefore covered by the Health and Watering Places Act, 1921, asserting that the Act limited advertising to newspapers published outside the district and to railway station publicity. Although the Minister has now relieved the councillors of liability, deeming that they acted in good faith, it appears desirable that the law relating to local authorities' powers to arrange illuminations should be regularised.

Tailpiece

AT the Washington World Power Conference Mr. J. C. Dalton, manager and secretary of the County of London Electric Supply Co., Ltd., presented a paper on the public regulation of private utilities. We consider it a tribute to his fairmindedness in dealing with this somewhat controversial subject that our New York contemporary, the *Electrical World*, describes him as "a municipal official of London supply."

Are We Doing Our Best?

Criticisms, suggestions, and a call to action by a well-known organiser

ARE the sales and distributive forces of the electrical industry still palpably below field requirements? According to recent statistics 55 per cent. of the wash-boilers in use are to be found in the areas of only twenty-nine out of about 600 undertakings; ten undertakings account for 25 per cent. of the cookers connected, twenty-nine for 44 per cent., while twenty-four undertakings have provided more than 50 per cent. of the water heaters.

Unfortunately these percentages are by no means in direct proportion to houses and families. To give one example: the figure of 25 per cent. for cookers represents a group of towns having a population of less than 11 per cent. of the total for the country and 11.2 per cent. of the total number of consumers.

In spite of this scarcely satisfactory state of affairs, everyone knows that there are few, if any, undertakings—even the smallest—where the sales and demonstration personnel is not working up to, if not sometimes beyond, its physical limits; difficulty in obtaining efficient jointers and perhaps also wiremen is a very common experience. The lament that "we are connecting them as fast as we can" is heard continually. It must be admitted that the progress curves displayed in every engineer's office really are certificates of endurance and achievement; indeed it is amazing how on earth such extraordinary results are obtained in view of all the disabilities.

Yet, surveying the country as a whole, electrical progress is very far from satisfactory—in a single year one big gas company connects over 300,000 new cookers and more than 600,000 pieces of domestic apparatus. Even allowing that a great deal of this apparatus replaces old and obsolete apparatus, it is nevertheless setting up a barrier that might take a decade to burn away, and the rate is, to say the least, a little surprising.

No Time for Thought

In what direction are we to look for the main causes? In the first place, it is humbly suggested that part of the trouble is due to the fact that too much work is resulting in too little time for pause, reflection and organisation. In the second place, are we not still too prone to measure progress year by year as a percentage increase on past achievement rather than as a more logical percentage of potential business actually obtained?

Again, are not most of our undertakings inadequately staffed—both as regards sales and operation—in relation to the potential market for all classes of electrical service? And, last, are not our conceptions and usually accepted principles of salesmanship (using the word in its very broadest sense) too often lacking somewhat in those imaginative qualities which are absolutely essential for mass selling—for a really big push?

If the truth of the first three suggestions be admitted the remedy can be only just round the corner. Management means directing, and certainly it should be accepted that boards of directors and municipal committees need at least as much *directing* as an experienced staff. Unless committees are prepared to accept and encourage such direction the work of the management must necessarily be impeded.

The last cause, in my opinion, is a more urgent matter, since the policy to be pursued with regard to the first three is, to a very great extent, dependent upon acceptance of a correct sales psychology. Unfortunately, space will permit only a very fragmentary examination.

Breaking Down Prejudice

Within the industry there definitely exists here and there selling personnel that is continually bringing powers of imagination to bear on this and that, and so far as it is permitted or able making the most of every opportunity. The results can readily be traced in the statistics already referred to. Great credit is due to those who from time to time succeed in removing large private plants and overcoming successfully formidable industrial problems. But it is the ordinary daily habits of tens of thousands and hundreds of thousands of people that will have to be attacked, and this task can only be tackled after we have learned to think and plan to scale.

Without waiting for legislation are there not many ways in which many of our activities can immediately, and with advantage, be co-ordinated? The day has gone for ever when the engineer of Wattcombe (and all the other engineers of all the other Wattcombes) can be satisfied to sit and design his own hotplate, regulate his own standards, fix his own tariffs and draw up his own advertisements. Artistically, the passing of this individualistic state of affairs may be a tragedy but it is vital to the development of the industry with which we are concerned.

It needs little imagination to appreciate what a tremendous influence it would have on development if, for example, we could secure reasonable standardisation in cooker design; a universal tariff at least so far as the secondary charge is concerned; identical and simultaneous sales appeals in every national, provincial and local newspaper in the land—on every hoarding, and in every showroom.

So often, in the south at all events, we either hear or make excuses for some of these disparities in sales policies and practice by pointing out that one competitor alone has the advantage of some two million consumers covering the area of a hundred or more electricity supply undertakings. Yet, in a marked degree, is it not possible to-day, if E.D.A.'s recommendations are followed and E.D.A.'s services adopted, to secure considerable uniformity in sales and publicity practice?

How to Advertise

Perhaps it can be shown by one or two simple illustrations what is implied by mass suggestion and action. The E.D.A.-E.L.M.A.-J.C.Q.O. "Better Light—Better Sight" campaign is an excellent example. This campaign is not concerned with an immediate sale of a lamp, or an immediate demand for a pair of spectacles. It is a big endeavour to make the entire British public "eyesight conscious" by means of an intensive effort which will proceed for ten weeks or so and continue thereafter as a part of the ordinary routine of selling. It will function through the advertising and editorial columns of the national daily, weekly and provincial Press; by the circulation of special publicity matter to millions of lighting consumers; by posters, window displays, showroom demonstrations, public lectures, &c.

In other words, from this different angle in selling—almost altruistic in its conception and operation—the nation will in a short time become as "eyesight conscious" as it is "teeth conscious" if we pull together; then a great volume of business will emerge for the supply undertaking, for the lamp and fittings maker, for the wiring contractor, for plant, cables, accessories, and so forth. It is just the difference between ordinary *shopkeeping* without imagination and *salesmanship* with a great deal of imagination.

Take another example: Are people really very interested in massage motors: u.v. lamps: refrigerators? Or, are they fundamentally interested in these appliances because they promise better health? Can it not be claimed that the wider use of electricity will beneficially affect the health of the nation. What a sales angle! What a campaign! if every interest involved could be persuaded to co-operate. Scarcely a piece of domestic apparatus exists without an amazingly good health story—reduction of atmosphere pollution: more sunlight: cleaner cities: cleaner buildings: clean lungs: reduced industrial and domestic fatigue. Vacuum cleaners and germ-free floors: refrigerators and pure food: cookers and clean food; fires and banished chill: controlled light and better sight: abundant hot water on tap: home washing and reduced risk of infection: sunshine in winter.

Advertising and selling with this basis is fundamentally sound: it is educative; it possesses just enough of the "fear characteristic" (an unquestionable advantage), and all the time it is creating confidence. Millions are spent annually by patent medicine vendors to create demand through fear—what a pity we do not seem to have the imagination to see that in electricity we have a vastly more interesting and convincing story for health preservation.

Cleanliness: comfort: efficiency—these, again, are all vital items which should not for ever be lost in copy, display, and sales talk in which ironmongery, or something equally inanimate, is permitted always to be the dominant note. If we could forget entirely for a time the ironmongery side of selling electricity and concentrate to a greater extent on these larger aspects with a universal appeal, how much more speedily could we make the whole nation really electrically minded.

Points to Consider

In all these problems it would appear highly desirable to bring the best selling brains of the industry together with a view to carrying out a very thorough investigation of these and other sales problems; for example: A universal secondary charge for electricity supply; elimination of wasteful competition in the manufacture of domestic appliances; standardising a range of cookers; fixing minima in regard to the number of salesmen and demonstrators for a given number of consumers—and *potential* consumers; the ideal layout and equipment of electrical showrooms; the establishment of schools for the training of jointers and wiremen to fill the ranks up to requirements to meet *potential* demand.

In these matters we should do well in the various sections of the industry to avoid working in too watertight compart-

(*Concluded at foot of next page.*)

Hire *versus* Hire Purchase. By R. Illingworth

Experience at Poplar has proved that working-class people prefer to hire their apparatus rather than acquire it over a long term

SOME time ago I was asked my opinion regarding the value to the industry of hire and hire purchase. To generalise on this subject is a difficult matter, for there are so many conflicting agencies operating against either one or the other in our industry to-day that the possibility of applying actual tests as to each of their merits on a large scale appears to be very limited.

There seems, however, to be a tendency for the large supply groups to prefer a long period of hire purchase at the expense of the simple rental schemes. To what extent this would indicate that simple hire is uneconomic where dividends have to be earned is an important question. It is obvious, however, that the gas industry has developed the long period hire-purchase method as a means of tying consumers down to gas cookers for the longest possible length of time. To my mind there does not appear to be the same excuse for electricity supply authorities to adopt the same measures, and any extension of hire purchase as distinct from simple hire can surely only be prompted by the plain economic reason that simple hire cannot be shown to pay its way in that particular area.

[Jerome

Mr. Illingworth, as borough electrical engineer and general manager at Poplar, has shown that electricity is within the reach of all homes at very reasonable cost

Regarding the appeal to consumers which each system affords, simple hire, and particularly some form of equated tariff, is undoubtedly the most practical and attractive method of getting electric cookers or other apparatus installed in the homes of working-class families. On the other hand, it is quite significant that hire purchase has been made moderately successful in areas populated largely by weekly wage earners, and it is probably safe to assume that the success of the hire-purchase scheme depends to a very great extent on the locality or class of public, salesmanship, and the campaigning methods adopted by the local authority.

If the gas companies can so successfully exploit long-period hire purchase by good salesmanship and well-planned campaigning, there is no reason why the electricity supply industry should not do likewise, provided it is equipped with proper commercially minded and energetic sales departments. One obstacle to hire purchase which time alone can remove is that the average British housewife has learnt by experience with gas equipment to expect a rental service from the local authority, be it gas or electric. This country is probably unique in this respect, but in other countries individual instances occur where the English hire system has been adopted.

Hire schemes, however, have the very obvious disadvantage from the consumer's point of view of limiting the choice of models, whereas under a hire-purchase scheme wider selections of apparatus can be made available and colour schemes or systems to harmonise with kitchen furnishings can safely be introduced or produced without in any way embarrassing the supply authority. This, however, is counteracted by the service and maintenance under the hire system.

My impression, for a great many years, has been that electricity supply should be treated wholly as a public service. However, I am going to limit my impressions of the difference between hire and hire purchase to experience in the borough of Poplar.

In January, 1934, I arrived at the conclusion that hire-purchase schemes, as applying to the public of Poplar, were utterly useless, for from October, 1930, up to date (September, 1936) the total amount of apparatus, both domestic and including motors and vacuum cleaners for that period of six years came to the grand total of only £2,719. It is significant that although an attractive hire-purchase scheme had been available for the whole of the period, only twelve cookers had been taken on hire-purchase terms on repayments over a period of five years.

In January, 1934, we inaugurated schemes of extended payments for apparatus. These schemes were based on a standard which takes care of every individual consumer, and the consumer in each case is only asked to repay according to his means. Since this system was adopted articles like electric irons have been sent out at the rate of three hundred per month. A proportionate rate of progress has been achieved with radiators, and I am convinced that to serve the public extended payments according to their means are absolutely necessary, for no one will deny the poorest person the amenities or the advantages of any type of electrical appliance.

In April, 1934, we produced the Poplar cooker and wash-boiler scheme, which includes all wiring and apparatus. This scheme was kept separate from any other tariffs whatever, and each consumer has a meter specially for the cooker and wash-boiler. The primary tariffs were 3s. 6d. per month plus 0.5d. per kWh, or, alternatively, 1d. per kWh "all-in."

In February, 1936, we inaugurated the 1½-gallon water heater in place of the wash-boiler (if desired), for in a district like Poplar, where the old properties are a problem, it is difficult to find accommodation for a wash-boiler. We therefore decided to put in a water heater where space was limited.

Under the Poplar hire schemes the results from April, 1934, to September, 1936, are as follows:—Cookers, 5,009; wash-boilers, 1,430; and water heaters, 625. The total average price obtained, taking an average of one thousand cookers and one thousand wash-boilers over a period of twelve months, including hire charges, is 0.92d. per kWh. Taking 0.5d. for the hire, this leaves 0.42d. per kWh for the energy consumed. All apparatus is furnished out of revenue.

Whether the Poplar hire system has been successful can be gathered from the following table of statistics taken from the year 1931 to date, for the hiring scheme has been generally accepted by the public, and a "snowball" effect has been the result. The average applications for cooker installations are sixty-four per week; this figure is steadily maintained, and in no case on record has any apparatus been rejected or returned other than in the case of change of tenancy, and in 90 per cent. of such cases the new tenant takes over the electrical apparatus:—

Year ended Mar. 31st.	kWh sold.	Revenue.	Average price obtained.	Expenditure provided from revenue for domestic apparatus.	Surplus or net profit.
		£	£	£ s.	£
1931	40,408,993	258,891	1.537	126 0	211
1932	43,315,439	263,907	1.46	109 0	6,247
1933	47,416,321	271,016	1.372	183 0	19,595
1934	50,538,689	276,761	1.314	52 10	35,948
1935	50,767,821	273,249	1.292	8,470 0	39,113
1936	55,904,513	289,253	1.242	21,364 0	39,869

In connection with the table, it is necessary to point out that between the years 1934 and 1935 two large power consumers, namely flour mills, were lost from the mains owing to amalgamation, the energy consumed amounting to approximately four and a half million kWh. It will be noted, therefore, that in these circumstances tariff reductions have been progressive, and the average price obtained includes all rental wiring charges and hire charges for apparatus.

Finally with regard to loading, the increased consumption on Sundays alone, over and above the consumption prior to these hire schemes coming into operation, is 60,000 kWh, the total units consumed during the year ended March, 1936, for cookers alone being 2,315,111.

I think, therefore, I have said sufficient for it to be convincing, from the Poplar point of view at least, that hiring is more successful than hire purchase.

Are We Doing Our Best? (*Concluded from preceding page*)

ments: perhaps we need a "League of Notions" with something approaching plenary powers to ensure general adoption when the right notions have finally been established.

"Without vision the people perish." To accomplish these ideals, if they are considered worthy of accomplishment, we need all the imagination and organisation at our disposal. Fortunately, ample material and personnel are already within reach: a few men of action, and determination on the part of the industry, could very soon transform these dreams into realities.

A Variety of Lighting Fittings by Leading Makers

1. Harcourts, Ltd. 2. Troughton & Young, Ltd. 3. William McGeoch & Co., Ltd. 4. Berry's Electric, Ltd. 5. Benjamin Electric, Ltd. 6. Mek-Elek Engineering Co., Ltd. 7. Dernier & Hamlyn, Ltd. 8. Electric Art Shades. 9. Euston Manufacturing Co., Ltd. 10. Kandem Electrical, Ltd. 11. Aladdin Industries, Ltd. 12. Maurice Bobin. 13. L. G. Hawkins & Co., Ltd. 14. Knightshades, Ltd. 15. General Electric Co., Ltd. 16. Falk, Stadelmann & Co., Ltd. 17. W. R. White & Co.

Beauty and Utility.

By Dorothy D. Newman

A woman's views on the design of domestic electrical appliances and suggestions for future guidance

ELECTRICAL apparatus should efficiently perform the duties for which it is designed, but it has two other duties, not so readily remembered—it must be beautiful and it must properly express *electricity*. Beauty in the twentieth century luckily means simplicity, and the more simple household appliances are the more useful they become.

In the very beginning it was perhaps necessary to introduce electricity into the home through known forms, but that period is rapidly passing, and with boldness on the part of manufacturers will, I believe, end altogether. Electricity will do all the things that have had to be done in a house from time immemorial, but it has superseded old methods and therefore should not be restricted in its scope by being forced to operate through old methods of application. The four things necessary in electrical equipment—usefulness, beauty, simplicity, and new design—are really the same thing.

With extended use there has been the tendency for appliances to improve, and this improvement will no doubt continue. Where improvement has not been rapid housewives are partly to blame for not making reasonable criticisms known to manufacturers, who on their part should be prepared to listen to such representations.

For this purpose there must be co-ordination among the consulted housewives, and there is room for a consultative committee of housewives on electrical apparatus, which might be set up by one of the electrical associations. The members of such a committee must definitely be practical housewives who themselves have used all kinds of electrical equipment, and yet have enough business knowledge to know what any alterations they suggest would mean financially and in the readjustment of a factory's plant. They must also have no connection at all with manufacturers, either through relationship or financially. In these days when many housewives have had business training suitable women should not be hard to find.

As we are definitely tending towards standardisation, agreement among manufacturers first of all might be a good thing; afterwards electrical apparatus could come up for review, say, every five years, so that any ill-effects of standardisation could be nullified.

Improving the Cooker

The principal domestic electrical appliance is the cooker. We can claim that electric cooking requires less effort, is cleaner and healthier, and, as we can practically seal our ovens, improves flavour; but we are still allowing cookers to follow traditional forms. Many of our ovens have too many movable parts to take out for cleaning, and here we might take a hint from some of the enamelled solid-sided ovens used in the Dominions which are cleaned with ease.

We are almost persuaded to throw away our frying-pans in favour of grilling only, in the interests of health and better cooking, but the grill on most electric cookers is by no means large enough for the average house. On the other hand, it takes up valuable space where there should be boiling rings of maximum efficiency. The top of the oven is the grill in some cookers, but although this arrangement allows for a larger grill it is not always convenient. Why cannot the grill have a space to itself under the boiling rings, and the switching be so arranged that the middle of the grill can be used for a small family and the whole for a larger one?

There should be three boiling rings at least on cookers intended for more than two persons, and one ring should really be capable of giving only sufficient heat for simmering. Something better is required than placing only the corner of a saucepan on the ring for the purpose. Our boiling rings have improved immensely, and now leave little cause for complaint, but women must get over the psychological difficulty of imagining slowness merely because they are missing flames and noise.

Thermostats are required, in my opinion, on all our ovens; these must not merely give degrees of temperature, but should be marked with different coloured bands—"Warm," "Hot," "Very Hot," &c.—and a card sent with the cooker should tell the user what foods can be cooked under the different indications. Not all women feel at home with thermometers, even if the cookery book tells them the degrees, and as cookers are placed in all kinds of lights in different kitchens, sometimes opposite a window, they are difficult to read, especially if the liquid is not even coloured.

The thermostat allows for cooking while shopping, and minimises any trouble occurring through lapses of memory, detention at the telephone, or answering the door.

Mrs. Newman is an active member of the E.A.W., and is the wife of Mr. A. J. Newman, City Electrical Engineer of Bristol

The ideal cooker from the woman's point of view is a high-level model with the oven door opening down to form a table. There is unfortunately not enough space in the modern kitchen for this arrangement. It is certain that the present-day builder has much to learn about kitchens; in breaking away from the old type, which was too large, he has swung too far in the opposite direction. This condition could be altered quite easily by the determined action of women, but there is still much that can be done with the proper disposal of the necessary things in the small kitchen. We are getting the combined refrigerator and cooker, which is excellent for space saving, but in the majority of cases the space under a cooker could be utilised for storing things required infrequently or perhaps once a day only, instead of something required many times which would necessitate frequent stooping.

There seems no need for the domestic oven to be as deep as it is. If it could be made less deep and longer horizontally four boiling rings could be set in a row on the top, one for simmering. Under two of the rings could be the grill, and beneath that a warming oven for dishes; under the other two rings could come the oven, with a storing cupboard down to the ground underneath both sections.

Cookers should always be all-enamelled, which is, of course, the practice to-day; but this enamel should take on colours or coloured trimmings to assist in giving an air of brightness to the kitchen which does much to relieve the monotony of everyday tasks.

English people are at last becoming refrigerator conscious, and manufacturers are responding quite well. Prices are coming down with use, and there is a tendency to give more room for the money, though some built-in drawers in all larger models would make the most of storage room and save the handling of odd dishes. Here, again, the appliance must be developed for building-in in new houses, and its outer case should be flat and easy to clean. Coloured refrigerators are coming into use, and this is a good development. Plain ones should be "off white" as a mass of dead white is seldom required in a kitchen. Complete silence is important in view of the less substantial construction of the houses of to-day; this applies also to vacuum cleaners and switches.

Vacuum cleaner attachments should be capable of more easy fitting without involving the picking up and turning over of a heavy cleaner.

Electric Heating Hints

Now that we have tubular and similar heaters the portable electric fire should function from the hearth. No other fires are expected to rely on the discretion of householders for their positions, but electric fires can be put in any ill-chosen place, and unsatisfactory results are attributed to electricity as such. The trend should be towards wall-mounted directional fires and built-in ones a little higher than the ordinary grate; up to 2 kW in one place should be sufficient. After the householder has got the cheerful glow that centuries of the coal fire have accustomed him to expect he should be urged to spread electric heat round the room for maximum comfort at no more running cost than is generally spent on heat for one place.

Electric fires also should follow new forms. Some types get dusty and are not easily cleaned. Where two reflector-type elements are used on a fire they are best arranged horizontally, as if only one element is needed the vertical treatment usually makes the fire one-sided and destroys the balance of the design.

When fires are definitely destined to stand in grates manufacturers should bear in mind the sizes of grate openings, which are standard. Only too often there are ugly gaps. I don't know if there is any reason why the bottom element of an electric fire should generally be switched on first from the

Interference-free Radio

By N. R. Bligh

The steps that are being taken to eliminate a domestic nuisance regarded from the manufacturers' point of view

Mr. Bligh is a member of the staff of the G.E.C. Research Laboratories, Wembley

IT is indeed unfortunate that most electrical plant, from the vacuum cleaner motor to the industrial machines, or the single-phase mercury rectifier to the grid power station, can cause disturbing noises to issue from the loud speakers of wireless receivers. This fact has been forcibly brought home to many branches of the electrical industry by the report of the committee appointed by the Institution of Electrical Engineers recommending legislation which would compel manufacturers to ensure that the radio interference, if any, caused by their products, attained a reasonably low value.

It should be recognised from the outset that some types of electrical apparatus are inherently miniature wireless transmitting stations, and that their potentialities as producers of interference with broadcasting can be reduced, but only under idealised conditions entirely removed. This fact alone would explain the large amount of detailed work which it is obvious has been carried out at the ninety-five meetings of the Institution, the B.S.I., and the E.R.A. committees during the last three years.

Minimising the Burden

The report shows that a practical way has been found of dealing with this difficulty in a manner which has taken care to cast only a legitimate share of the burden upon the manufacturers. It would have been possible to recommend modifications to electrical plant which would have been uselessly severe, and caused such extra manufacturing costs as to retard development. Alternatively, the minimum modifications possible, using existing technique, might have been considered, and a uselessly low level of suppression laid down which would have done little to remedy the present state of affairs.

In 1934 the Committee had to report that while it could agree as to the amount of interference which was just tolerable in reception, and also the strength of the signals which it was desired to protect from interference, it could not agree on any method of rating or measuring the interference caused by plant. The later report is therefore specially reassuring to the manufacturers, as it makes clear that by means of straightforward measuring apparatus, the performance of any particular machine or appliance can be found in concrete terms.

This opens the door to the framing of regulations and specifications, but it is even more important that the manufacturer now has a tool which enables him to improve the performance of his product in the most economical way, and to reach any given level of performance by design procedure as logical and straightforward as that calling for the use of the more familiar indicating meters normally used in improving a product.

In practice, however, the working out of such design procedure will take most manufacturers a little out of their usual course. Those who are engaged on this side of the design must have a certain flexibility of outlook. They must be prepared not to regard a washing machine motor or an electric sign in terms of their normal operation, but rather as a collection of radio-frequency impedances, some obvious, but others existing only as the unintentional capacity between various conducting bodies or in the impedance of connecting leads. It is therefore probable that manufacturers dealing with a wide range of products may find it best to leave this side of all their designs to one man who specialises in this work, while the smaller manufacturer will probably find amongst his staff a man whose general interest in wireless receivers will have given him sufficient knowledge to operate such testing apparatus as is proposed.

The obvious aim of the Committee was to recommend that the degree of suppression called for should only be such as it had been agreed was desirable. To ensure this it is proposed to treat the apparatus likely to cause interference in the following groups:—(1) Lifts in buildings; (2) trolley-buses and trams; (3) household electrical appliances; (4) small electric motors used in commercial premises; (5) neon display signs. (6) certain rectifiers for power plant; and (7) electromedical apparatus.

It is also probable that the ignition systems of cars will cause interference with television reception, and a permissible level will have to be found for such interference, and hence even this sister industry may be affected.

While it would have been very useful from the manufacturers' standpoint to have definite statements as to the auxiliary apparatus required for any one class of products, it has been found impossible to do this in most cases, and to have done so would indeed have removed the main impetus to progress. For some types of specialised apparatus which is made to specified design this course has been possible, however, and the Committee has not hesitated to recommend its adoption. This applies at the moment to traffic signals and trolley-bus equipment, and such cases are of importance because a round figure used as a limit in the alternative method

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Beauty and Utility *(Concluded from preceding page)*

power plug. This is quite wrong with a portable fire which is sometimes placed on the carpet, and, as often one element only is needed, the first to go on should be the farthest from the floor. Some old fires had the bottom element slightly tilted upwards, an idea which might be employed with advantage again. Also if the elements of flat electric fires could be set back a little from the surface of their surrounds this would allow more protection to be given by the bars across the front of them. The wiring should be run so that fires could be switched on from doors or bedsides for convenience and cheerfulness.

Washing machines are developing well, but as a good deal of the strain of washday is in carrying water they should be so designed as to be filled and emptied without strain to the housewife.

Two small things, the toaster and flat-iron, might just be mentioned. The toaster is a useful piece of apparatus but its operation should be speeded up, and arrangements should be made on every model for turning the toast. It should also always be obvious where it should be picked up after use to avoid burnt fingers.

The flat-iron needs a solidly constructed handle to prevent irritation due to screws working loose and the handle turning in the hand. The handle should also have a larger grip in most cases, as a small grip pinches the palm of the hand. The size of the old flat-iron handle was determined by its use with a holder, which is not required with the electric iron. Thermostats and curved sides to iron round buttons will, I believe, in time become general.

In a large number of towns electricity is obtainable at ½d. a unit and under, but *some* demonstrators and sales staffs have not yet realised that the doctrine of rigid economy can now be given up. A wise housewife plans the cooking of her meals, and she is not endeared to electricity if she is given to understand that unless she fills her oven at every cooking—an unnecessary proceeding in ordinary households—she is wasting electricity, or if undue insistence is placed on a need for expensive pots and pans. Electricity should give the housewife less to think about and not more.

Too much reliance is placed upon the belief that electricity sells itself and that electrical appliances will also do so. There are still many people, however, who have not had opportunities of getting acquainted with electricity and who therefore need help and guidance in making up their minds. It must not be assumed, as it so often is, that they are as familiar with electrical catalogues as is the sales staff and that they will ask for what they want spontaneously.

Public taste should be educated in our showrooms, and there should be more effort to keep architects and builders posted with new things. It seems to the housewife and showroom customer that the methods of selling electrical equipment in a far too large a number of cases constitute a great weakness in the electrical industry. Selling is not given the important place it should have, and its importance is paramount.

of assessment bears no direct relationship to the particular cases thus dealt with, relying as it would do on the average proximity of the wireless listener's aerial to an interfering appliance.

The Necessity for Compulsion

The Committee recognised that there was no real inducement to take positive action in reducing interference when similar apparatus, designed without such precautions, could appear on the market at a lower price. The B.E.A.M.A. representatives, in particular, did not consider the application of a mark to an article, guaranteeing that it did not interfere, would in itself be a sufficient inducement to overcome price differences. Compulsion was therefore necessary to ensure that all marketed articles, both home produced and imported, reached the necessary standard.

It is stressed, however, that compulsion should only come by stages when it is certain that the technical performance necessary from each class of products has been ascertained. An interim period between the issuing of regulations and their enforcement is foreshadowed, and it is essential that this should be so. In this case and others the Committee could not go beyond recommending that the legislating authority should act "under suitable technical guidance and safeguards," and obviously it will be in this way that the manufacturers must see that they are not caught napping or caused unnecessary hardship.

The thorny question of who shall pay for adapting existing apparatus is one which fortunately will not generally concern the manufacturer, though it appears probable that in cases where he has sold large quantities of any particular item, it may be worth his while to stock a small quantity of suitable suppression devices.

The final recommendations suggesting the outlines of the machinery for issuing regulations should meet with the approval of manufacturers, and it is also specifically recommended that all interested parties should have an opportunity of being heard before the Electricity Commissioners take action with regard to any specific apparatus, and an opportunity to apply for amendments where necessary. The Commissioners' task will be particularly difficult if it appears that any particular appliance cannot be economically rendered "non-interfering" as it is implied in paragraph 21 that they should be empowered to forbid the use of such an appliance. It should be recognised that such a case is very unlikely to arise.

Research Must Continue

From the Committee's report, it is clear that some further research is necessary, and it is suggested that the Commissioners should be empowered to institute such investigations. By this means it may prove possible to ensure that the manufacturers have adequate assistance to enable them to make their appliances interference-free without undue expense, and to do their part in avoiding unfortunate reactions due to the incompatibility of the products of two allied industries, one of which is only able to help itself to a limited extent. Such expenses as are incurred should, it is suggested, be defrayed out of the quota of the wireless receiving licence fees which the Post Office retains.

While it is suggested that some other body than the Electricity Commissioners may be made responsible in particular cases for the regulations governing the design of plant, it is to be hoped that it will not often be necessary for such a step to be taken, or some confusion and difficulties appear likely in the setting up of uniform performance standards, and in the ensuring of uniform safeguards.

The work initiated by the I.E.E. committee has already produced some concrete results other than the recommendation of an acceptable programme for the future. A long list of E.R.A. and G.P.O. documents dealing with suppression summarises the work of the technical committees, and the publication of such of the Post Office Radio Reports as are of general interest, would be very welcome to manufacturers of electrical appliances.

Standard Specifications

There has also been one general publication by the British Standards Institution (B.S.S. No. 613-1935) which deals with the ratings of components used for suppressing interference, and gives general indications of the methods and values of components found to be suitable. This is to be followed up by a specification of the actual measuring apparatus to be used in determining the performance of interfering plant, which will be invaluable to the manufacturer as it will enable him to do the necessary development work to ensure that his apparatus comes within the prescribed limits in the cheapest possible way.

Further specifications are in hand for dealing with interference from trolley-buses and tramways, neon signs, ignition systems and electric lifts, but it appears probable that a good deal of further work must precede the issue of the most important specification dealing with the permissible limits of interference which must not be exceeded, in any given class of apparatus, for qualification for the mark guaranteeing its non-interfering properties.

The International Electrotechnical Commission co-operated with the Committee. From the point of view of export, it is essential that the countries concerned agree at least on a method of rating the radio interfering properties of electrical apparatus. It is to be hoped that agreement will be reached between various countries on the permissible limit of interference, as this would avoid the duplication of types for export purposes.

Even if this desirable end is not reached, there should at least be the minimum of difficulties in export if all countries are agreed on the method of rating and the type of suppression required, differing only in the degree.

Whilst the manufacturer may feel that it is unfortunate at this rather late stage in the history of electrical development that this new, and to him unimportant, aspect of design has to be considered, it does appear that the I.E.E. Committee has faced the realities of the situation in such a way as to reach the only possible solution which ensures the minimum of hardship to both parties concerned.

A Further Selection of Lighting Fittings

1. A Euston Mfg. Co. fitting. 2. Kandem table lamp. 3. A Harcourt ceiling fitting. 4. A G.E.C. wall bracket. 5. An Aladdin lamp. 6. A Hawkins floor standard. 7. A Tucker & Edgar table standard

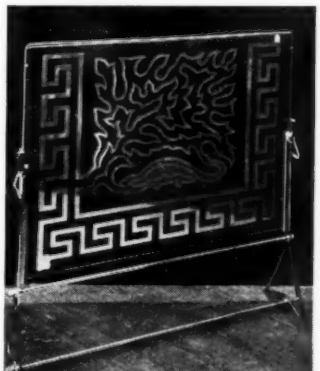
Electric Warming Equipment

A survey of the principal types of heater on the market—fires, convectors, panels and tubes

ALTHOUGH electric heating is being employed very extensively in newly erected houses and flats, the fact remains that people are still inclined to think of it in terms of portable radiators which can be carried from room to room to provide warmth at odd moments and in odd corners. This is all very well but it should be remembered that apart from considerations of appearance, convenience and suitability, every portable fire purchased may spoil the market for at least one or two heaters or heating installations of a more permanent character.

This state of affairs is likely to persist until the public is "educated" to appreciate fully the merits of other types of heaters. Would not a little intensive publicity on the part of electricity supply authorities, electrical contractors and retailers in their showrooms and windows help in this direction? By drawing attention, for example, to the many attractive finishes now available a big market is opened up for permanent or semi-permanent insets to harmonise with particular schemes of decoration.

The efficiency and low running costs of thermostatically controlled convectors, tubular and panel heaters, might also be stressed with advantage, since, sad to relate, they are still seldom encountered in the home. Manufacturers, although they can to a certain extent stimulate the demand in the required direction, are obliged to produce what the public demands, and it rests to a very large extent with the supply authorities and retailers to help prospective customers to choose the apparatus which in the long run is going to be the most suitable and profitable to all parties.



Two glass panels radiate the heat in this new product of Pilkington Bros., Ltd. The pattern is actually the "elements"

However, things being as they are, let us turn our attention to the types of apparatus most in demand to-day. Dealing first with living room equipment, it appears that there are two distinct classes of purchaser. The first, probably the larger, wants an imitation coal fire if it can be afforded (the prices of the cheaper models scarcely make qualification necessary). The other, declining imitations, asks for a plain straightforward electric fire.

Nevertheless, people in the latter class will almost always admit to a liking for some visual effect such as has, for instance, been introduced with good results in Berry's "Haloberry" series where the illumination on metal screens around a central fire of the reflector type can be varied to convey an impression of warmth or coolness. A very pleasing effect is also produced by the warm glow emitted by the beautiful models made by Tricity Cookers, Ltd., who, in spite of their name, are still large manufacturers of fires, especially for use in big housing estates; their well-known "Sunray Tricity" models, which are sold exclusively by Messrs. L. G. Hawkins & Co., Ltd., have this season been further improved in appearance by reducing the size of the louvres. Carron Company has given a very pleasing appearance to its new "Study" model (which incidentally has its switches on top) by inserting a red tubular lamp behind a "fender" which has decorative slots; this idea has also been used in the Elexcel "Floodlit" models.

One of the latest 2-kW Catterson-Smith fires

Decorated glass panels are illuminated by lamps concealed in the bodies of the Belling "Chelsea" and "Canopy" fires, while in several of the Heatrae models such as the "Majestic" and "Regis," a red glow is thrown (by lamps inside) on to glass panels above or at the side of the reflectors. Several other methods have been adopted to create the impression of comfort, but we still think that this "psychological" aspect of heating is in its infancy. While on the subject of visual effect it occurs to us that there might be a big market for tubular lamps for use in place of elements in reflector type fires during summer months. Elexcel, Ltd., is rather keen on this idea, in fact.

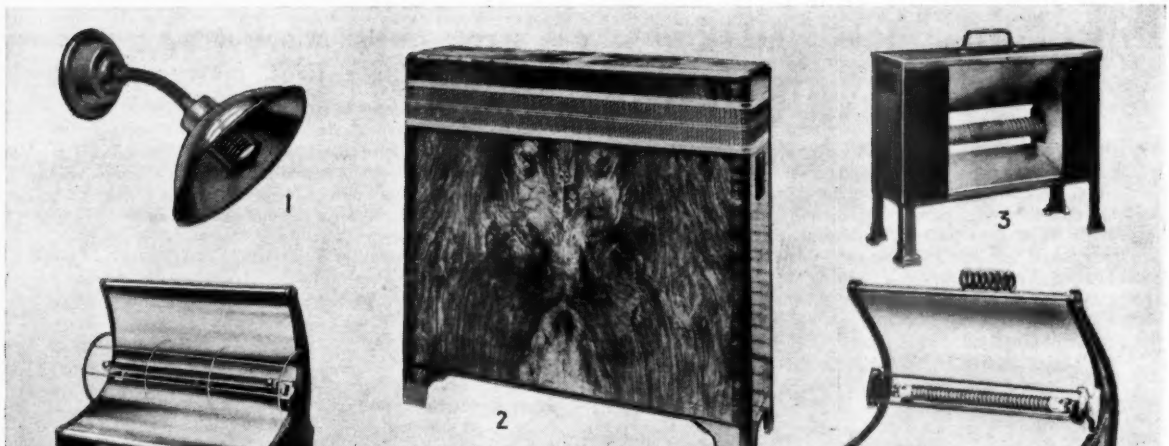
The Premier "Gainsborough" fire

As distinct from the fires mentioned there are the combined units which serve as sources both of lighting and heating. The "Unity Sunglow" is a well-known example of this, and its manufacturers have now introduced a new unit incorporating a flood heater panel with strip lamps along two sides. The "Lightfoot" (Space Heating, Ltd.) is designed upon the same lines, and two semicircular strip lamps are also used as the source of illumination in the Harcourt "Heatlite" bowl type pendant unit. The new "Heatlite" floor standard has a 1-kW metal sheathed element mounted on the tubular metal pedestal: a reflector is provided at the top and it accommodates a 60-W lamp for upward illumination and three 40-W lamps externally for diffused lighting.

As a counter to the assertion that the flicker effect of an imitation coal fire may in time become monotonous, Premier Electric Heaters, Ltd., have incorporated a simple means of varying the rate of the smoke and flame effect movement in their new "Gainsborough" fire, which is a more imposing edition of the popular "Gresham." An improved appearance is also attained by British National Electrics by fitting basket grates to all three of its new imitation coal fires, while the new "Supercoal" effect is utilised in two "Sunspot" models which Messrs. Falk, Stadelmann & Co., Ltd., are marketing at a very competitive price.

The "P.H. Phantom" convector (Greene, Phillips & Co.)

Manufacturers are still vieing with each other to produce the perfect "fuel," and Ferranti's have made considerable improvements in their patent coal. The new flicker effect which Berkeley & Young, Ltd., have incorporated in their "Paragon de Luxe" is actually electrically driven by a disc motor, is unaffected by accidental vibration, and produces "flame"



1. R.E.A.L. bathroom fire with flexible mounting. 2. "Servel" convector (Utilities (London), Ltd.). 3. Bratt Colbran "Tu-Way" heater. 4. Elexcel reflector fire. 5. Walsall Conduits "Jupiter." 6. Falk, Stadelmann "Sunspot B." 7. "Gee Gee" hot-water radiator (Geo. Green & Co.). 8. Premier "Sylph." 9. "Crescent" imitation coal fire (Albert Phillips, Ltd.)

which really seem to leap up the chimney, while the new fuel of the "Xcelcoal" range reproduces very realistically the effect of moving flames and curling smoke. The design of an inexpensive coal-effect fire, the "Neatlite," by Brown Bros., Ltd., is claimed to give the maximum heat with minimum current consumption.

There is a diversity of views as to the best position for the elements. In most designs they are situated horizontally above the fuel, but there appears a growing tendency, as instanced by the "Paragon De Luxe," already mentioned, and by the Belling "Duplex," to place one element horizontally above the fuel and one vertically on each side, the reflectors being arranged so as to radiate the heat at the sides as well as the front.

In contrast to these, Messrs. Albert Phillips, Ltd., and others in some models mount the fuel above the elements, while there is still a lot to be said for concealing the elements behind the "coal" and throwing the heat into the room *via* a reflector, as is done in several of the "Efesca Surves Supercoal" series. For the Berry "Adjustacoal" fires, which can be adjusted by a simple telescopic movement to fit standard slow combustion openings from 15 to 18 in. wide, the elements are provided on a separate trivet. This device has also been largely adopted for use with fires of the brazier and open grate type, though Messrs. Bratt Colbran prefer to conceal the elements in the chimney space above and use reflectors. In the "Creda New Ascot" model for inserting in existing grates the fuel is situated behind a reflector type fire.

In all types of fire, both imitation coal and otherwise, the use of rod-type elements with parabolic reflectors is growing considerably, partly because of the shorter time taken to heat up, but mostly because they convey the effect of giving more heat. Indeed, Messrs. Bratt Colbran are now producing reflector-type fires almost exclusively, using for the sake of appearance elements of a smaller diameter than hitherto. There are some reflector fires, notably the Ferranti, which are designed specially for "flooding" the bottom of a room with heat, so that they must afford a wide distribution.

In some cases, however, the focusing qualities of the reflector fire have the disadvantage of rendering it unsuitable for use in small rooms, where furniture or bedding in close proximity might possibly become overheated, and for this reason alone the refractory type element cannot be considered obsolescent.

Manufacturers are alive to the advantages peculiar to each type and are out to meet all requirements. British National Electrics, for example, are offering their "Talisman" imitation coal model with alternative elements, while the "Creda Log" fire, an old favourite, can now be supplied with twin rod-type reflector elements.

The design of reflectors depends largely on whether they are intended primarily to direct the heat where required or to produce a visual effect. Two Hotpoint models, Nos. 20 and 66, are excellent examples of this. The latter has a smooth surface with twin bar-type elements mounted in their most efficient position in the centre. The "No. 20" model is given a pleasing glow effect by using a hammered reflector, which, though throwing the heat well out into the room, has no very great directional qualities. Another example of this latter type is the Premier "Countess."

While designed primarily with a view to still further efficiency, the reflectors made of "Solium," which are now fitted to all Ferranti fires finished in oxy-copper, match the copper and give a much warmer appearance even when the fire is switched off, being particularly effective in their "Flamera" models. This new material is claimed to possess an 8 per cent. higher efficiency than chromium.

Manufacturers find it difficult to avoid making light construction fires which do not look flimsy. Messrs. H. G. Moseley & Co., Ltd., seem to have struck the right note in their "Old English" reflector fire, the frame of which is in the form of scrolls. This company, as well as others such as the Dowsing Co. (Electrical Manufacturers), Ltd., Inventum Electrical Appliances, Ltd., and Walker Hunter & Co., Ltd. ("Glorex"), have been very successful in evolving simple yet attractive forms of what have inevitably, yet confusingly, become known as "tubular fires." On account of its neatness, lightness and portability, this type of apparatus is becoming increasingly popular, especially for use in surroundings of the more modern type.

Generally speaking, the elements used in reflector fires are of the rod or pencil type, but in the "Falco No. 245" (Falkirk Iron Co., Ltd.), "Mosaic S.R." (Girlings, Ltd.) and in

an attractive new range of "Walglow" models (Walsall Conduits, Ltd.) "coiled-coils" have been adopted as standard. To avoid the breakages in transit or service which often cause trouble in this type of fire, the elements of the "Mosaic S.R." are mounted on exceptionally flexible terminals.

Many of the smaller fires are made with adjustable reflectors and several have arrangements for wall mounting, either by screws (as in the Electroway and Graham-Farish "Parabolic" models or by a wall shoe (as in the Morphy-Richards "Junior Safety" type). The wall mounting feature renders this type of fire particularly suitable for bathrooms, provided always that the switches and the fire itself are placed in a safe position. In most reflector or bowl fires which are designed primarily for bathrooms, *e.g.*, the Reyrolle "Reydome" and English Electric models (the latter is now fixed with an improved element connection), cords are provided for adjusting the reflector. As a rule the loading of a bathroom radiator is not more than 1 kW, but we think Bratt Colbran are right in making a 2-kW model since after all the heat is required quickly and only temporarily. While speaking of bathroom heaters we must not forget the other types available, such as the Vidor "Universal" radiator, the Jackson wall mounting models and the "R.E.A.L." bowl with flexible arm.

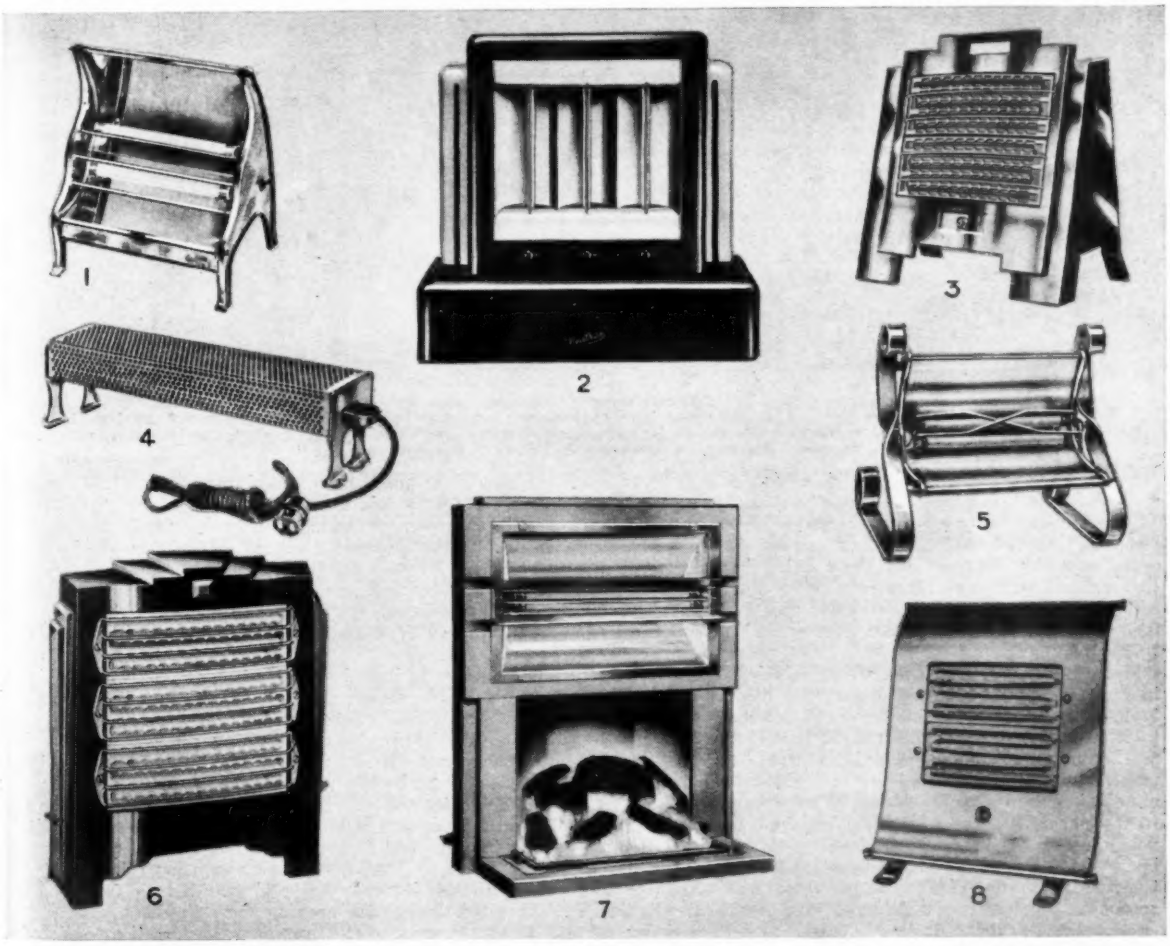
Before leaving reflector fires there are three other types that should be mentioned: the "Arora Projector," which has two reflectors in one piece set at slightly different angles, a 2-kW Bratt Colbran model with two reflectors almost back to back so as to throw the heat all round, and the Catterson-Smith all-insulated fires made entirely of moulded clay. The last mentioned have been evolved as a result of electric furnace manufacture and incorporate "Kanthal" elements which operate at the exceedingly high temperature of 1,050 deg. C. These fires can be supplied in almost any colour and with the reflecting surfaces coated thinly with gold or platinum present an attractive, if unconventional, appearance.

Another type of all-insulated fire is the Supremus Specialities' imitation coal model, the body of which is constructed entirely of bakelite. Wood has been used very effectively as the frame of the Belling "Oak" fire, while a material new to fire construction and with considerable possibilities makes its appearance in Pilkington Bros.' "Armourplate" glass radiator. In the latter two glass sheets are mounted in a light chromium frame almost touching one another and themselves radiate the heat, the "elements" being deposited in the form of a pattern on the inside surfaces of the glass.

While many manufacturers are racking their brains to find methods of breaking away from conventional design, others, the Jackson Electric Stove Co., Ltd., among them, are content to continue lines which proved popular last season. Among the "revolutionaries," Messrs. Bulpitt & Sons, Ltd., have produced some very attractive models in their "Cromwell," "Marlborough" and the pyramid-like "Moderne." The "Redot E. 30195" (Lighting Trades, Ltd.), with its side pillars of unequal length, the "Crescent No. 152" (Albert Phillips, Ltd.), and the Siemens 'Lincoln" and "Cambridge" also show the "modern" trend.

In spite of the much improved products available to-day, prices show a distinct tendency to decrease, though whether the increasing costs of raw materials will arrest this remains to be seen. The General Electric Co., Ltd., now offers a 1-kW sheet-metal fire of its usual high standard of material, workmanship and efficiency, at a very low price. Unlike many fires of this class, special efforts have been made to ensure that the finish will not blister, peel or discolour; further, the metal base is folded under so that no sharp edge is left to damage the floor covering. Most of last year's G.E.C. models are continued, nearly all with slight improvements, such as setting the elements at a greater angle to prevent overheating of the floor, and a new 2-kW reflector fire in sheet-metal of simple modern design is available in antique copper or antique silver with chromium-plated reflectors.

Apart from metal, of which chromium or oxidised silver now hold pride of place, the most popular finish is apparently buff or a neutral colour such as the Belling "Neutone" marble finish. The Sun Electrical Co., Ltd., one of the largest wholesalers in the country, finds that greens or greys are favourites, though different parts of the country have different tastes in colours as well as construction. The Northerner is usually satisfied with a sheet-metal fire where the Southerner would demand a more imposing vitreous enamelled model. But he would indeed be hard to please who could not find a colour and finish to please him among the metal tones and wood grain effect "Creda" finishes. New cream, "sunrise" and



1. Arora projector fire. 2. Heatrae "Majestic." 3. Revo "Geneva." 4. Vidor bathroom heater. 5. "Old English" reflector fire (H. G. Moseley & Co., Ltd.). 6. A popular Jackson model. 7. Ferranti "Flamera 642." 8. Dowsing screen fire.

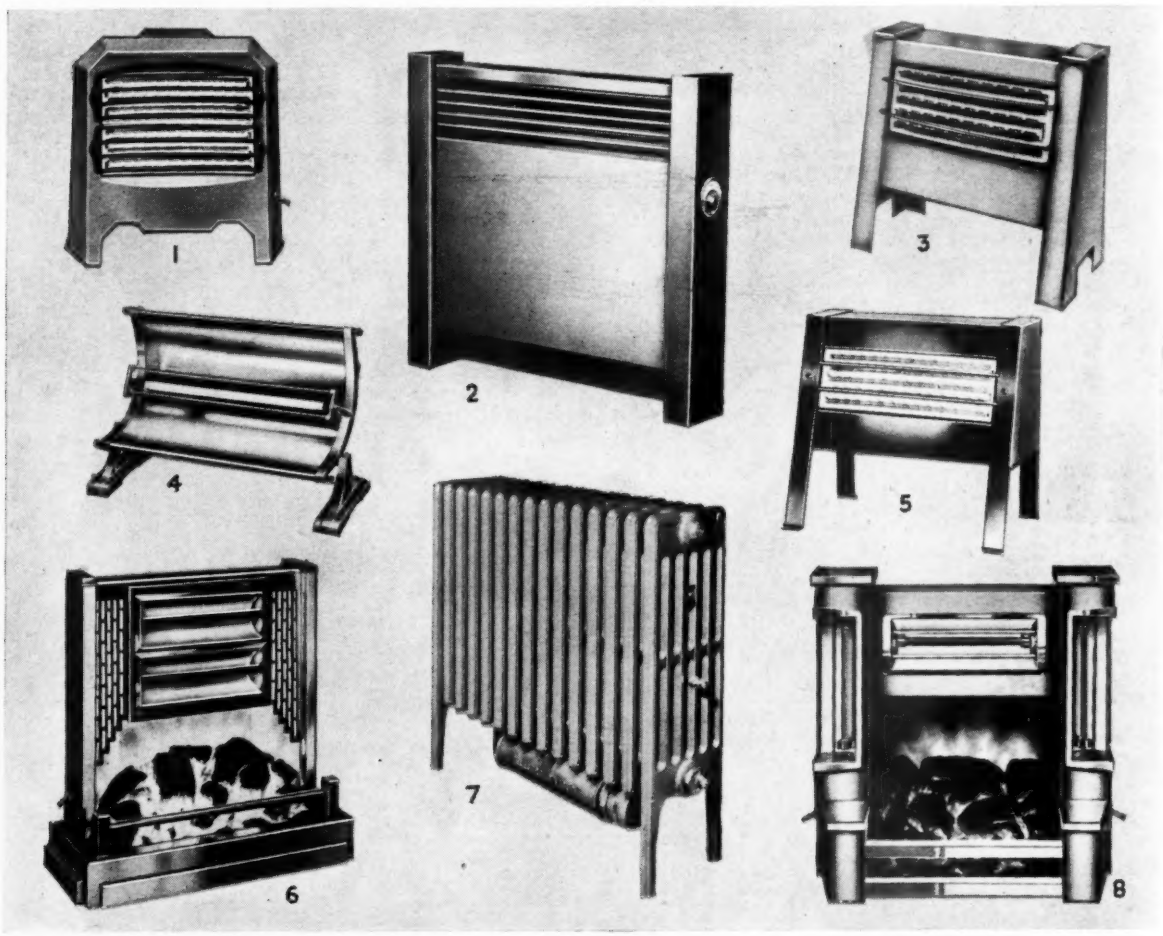
" natural marbline " finishes are being introduced by B.N.E., who are discontinuing their art colours.

Every house erected without chimneys and flues saves the builder between £5 and £70. This fact alone is sufficient to account for the popularity of the inset fire for new buildings. So many different and attractive types have made their appearance that we can only mention a few of the features which struck us most forcibly.

As a contrast to the strictly utilitarian models such as the Walker Hunter " Lounge," Tabard, Ltd., specialises in designs and colourings for harmonising with decorative schemes of any period. Its coloured stone wall plaques and hand-painted overglazed pottery wall panels are particularly beautiful, the incorporation of electric clocks in some designs being a feature which is likely to become more widespread. The surrounds by Slate Slab Products, Ltd., are also unusually attractive.

of mounting insets and surface models. One screw serves to hold the " Mitchell-Civic " inset (Mitchell Electric Co., Ltd.), a metal " box " being fitted to the surround by means of patent adjustable clips. The Bell Fireplace Co. has developed a hook-on device embodying a slotted fixing bar (built in flush with the wall) to which the fire itself is attached. Many insets such as the Walsall " Comus " can be supplied in frames for surface mounting. The Revo Electric Co., Ltd., is a strong advocate of the built-in fire both on account of economy and appearance, and stresses the importance of allowing ample room for expansion when using surrounds of marble, slate, glass, and other brittle materials.

Electroway Heaters, Ltd., tell us that many makers of " reconstructed marble " and other one-piece surrounds have great difficulty in mounting electric fires, although coal and gas fires may be satisfactory in them. The latter require



1. English Electric portable model. 2. Unity pillar type convector. 3. Low-priced G.E.C. fire (D.2494). 4. Graham Farish parabolic reflector. 5. Light construction fire (L. G. Hawkins & Co., Ltd.). 6. Berry's " Solaberry." 7. Benham " Electro-Vapour " radiator. 8. Berkeley & Young " Paragon de Luxe "

A stainless steel inset, also available with a stool to give a fireplace effect, is a new product of Messrs. James Smellie, Ltd. Three reflector elements in steps are employed in a pleasing Inventum panel, while a circular inset is a neat contribution by Electroway Heaters, Ltd. For the imitation coal enthusiasts, Berry's Electric, in addition to the " Adjusta-coal " series, has inset panels surmounted by " Magicoal " fuel. Convector units for recessed fixing are now supplied by Unity Heating, Ltd.

Messrs. Bratt Colbran, Ltd., whose principal business is in inset fires, report a growing demand for models designed to fit into existing grates, and Messrs. Eastwoods, Ltd., claim to have produced a portable mantel model which gives the maximum amount of radiant and convected heat. All-metal mantels complete with fires are also becoming popular and are obtainable in a large selection of coloured enamel finishes from companies such as the Falkirk Iron Co., Ltd. Two new sheet-metal surrounds available in three finishes (silver body with black top and base, beige, and mottled gold) have been added to the G.E.C. range; these will accommodate any of the standard 1- or 2-kW inset fires. A patent swivelling system enables the " Inclina " outset model (Berkeley & Young, Ltd.) to be adjusted so as to throw the heat where most required.

Particular attention is being paid to securing simplicity a surround in the form of an inverted " U," whereas an electric fire is fixed in a recess in the middle. The heat causes greater expansion of the top than of the bottom and cracking results. By the adoption of certain methods covered by a provisional patent, this company claims to be able to keep the top of the surround comparatively cool (about 100 deg. F. rise in most cases), thus enabling its fires to be fitted into surrounds which would crack badly with other types of insets.

Ventilation is indeed a problem, particularly where insets are concerned. Messrs. Belling & Co., Ltd., are convinced of the desirability of fitting a shelf a few inches above panels or fireplaces. This, besides directing the hot air flow into the room, prevents discoloration of walls. In Belling insets an inlet at the bottom permits cold air to pass up the back of the fire (so cooling the wall) and, passing out at the top, provides a certain amount of convected heat. Similarly, in addition to box backs for slabbing into the surrounds the latest insets by Brightglow, Ltd., have inner backs attached to which are deflectors so fitted that hot air from the rear is directed through the opening above the bars.

In small rooms where space is a consideration, corner fires often solve the heating problem. The " Efesca Temple " insets are now available with plinth and top for corner fixing, while one Belling corner model is fitted with a cupboard

above which can be used for airing purposes. One way of obtaining "quick heat" is by means of the fan radiator supplied by Messrs. W. T. Driver, the fan driving air through a nickel-chromium "A" resistance wire.

"Screen fire" is a term which shows a tendency to be used for fires like the "Bell" models which are, in effect, insets. Surely its reservation for apparatus such as the Revo "Scroll," the Dowsing screen and Bulpitt "Winchester," which really are screens, would save confusion.

Most of the general public have never heard of a convector, but we have yet to discover a user who is not completely satisfied with its performance. There still seems a good deal of doubt as to whether convector apparatus should be confined entirely to low-temperature heating or whether it has equally promising possibilities in the high-temperature field. Anyhow, a risk that must not be overlooked is that manufacturers may kill the market by producing apparatus that is unsuitable for the particular purpose for which it is required.

A commonly heard objection to the convector, for use in the living room at any rate, is the same as that applied to hot-water radiators, namely, that it does not provide the focal point to which centuries of wood and coal fires have accustomed us. This disadvantage is being overcome by fitting some sort of visual effect either on or in the case. The new "P.H. Phantom" convector (Greene, Phillips & Co.) has been given a most satisfying glow effect by fixing on the front a slotted panel through and round the edges of which comes a warm light from pink tubular lamps; the low discharge-air temperature of these convectors (about 120 deg. F.) makes it possible for them to have wooden external cases, which may be designed to meet particular architectural or decorative schemes. In the "Creda Summit" and the J.P. Tubular Heater Company's latest models small illuminated grilles have been inserted about a foot from the ground.

To ensure an even distribution of warm air throughout the room and to obviate the blackening of walls, the rod-type elements of the G.E.C. convector have been fitted in a series of specially designed ducts. New "Unity" models only 5 in. deep are fitted with baffles which throw the air well out into the room and not straight up to the ceiling as in so many models. Another particularly narrow heater of low price is made by the Arora Co. The finish and colouring of the "Convectum-Air" heaters (Benham & Sons, Ltd.) are particularly effective and obtainable to suit any decorative treatment desired. Recessed handles permit the Heatrae convector to be carried easily from room to room, while the new lightweight grilles of the British Trane Co.'s "Vectair" models afford 85 per cent. free area and can be fitted to give air discharge in practically any direction.

Since its construction ensures cold outer surfaces the "Thermovent" apparatus may be enclosed behind panelling without fear of damage to the decorative surfaces, which remain at room temperature. The smooth surface of the type "S" streamline model does not collect dust, and the absence of sharp corners is an advantage when fitted in confined spaces.

1. Belling "Chelsea." 2. Electroway inset reflector models. 3. Bray radiator. 4. Bulpitt "Winchester" screen. 5. Substantial cast fire (Hotpoint). 6. Eastwood's portable panel type "P 92." 7. Thermidair combined convector and radiator. 8. "Creda Peerless" with glow effect (Simplex Conduits, Ltd.). 9. Carron "Study"

Glow panels with or without heat can be provided if required.

A novel form of convector, the "Servel," marketed by Utilities (London), Ltd., has just made its appearance. The heating units, which comprise the elements inside copper-finned tubes, are contained inside a sheet steel casing constructed to form a flue. At the bottom of the casing a silent intake fan is fitted to ensure the correct flow of filtered air over the heating elements. The effect is to produce a large volume of moderately heated air which flows through a grille which extends right round the cabinet and so enables the apparatus to be placed in the middle of a room if desired. A shutter device closes the back grille when the heater is required for standing against a wall.

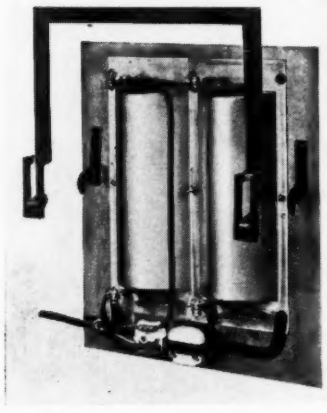
Nearly all convectors can to-day be supplied with thermostats incorporated, but the use of time-switches to place them in circuit about an hour before the room is required has not yet been adopted to any considerable extent.

In addition to convectors proper there are several models combining features of both convectors and radiators. These range from apparatus such as one of the "Thermidair" model, which is actually a convector plus a reflector-type fire let into the front of the case, to the Belling "Zephyr," which is to all appearances a reflector-type fire with a small convector

placed above. Into this class comes the "Bi-Heat Duplex" (Bertram Thomas), which relies to a large extent upon the front panel of its metal casing acting as a radiating surface.

Similar in application to the convector, the electric radiator in the form of the familiar hot-water radiator may or may not contain water. Messrs. Benham & Sons, Ltd., tell us that sales of their "Electro-Vapour" radiators are considerably greater than those of the "Electrovex," which appears to indicate a preference for the water-filled variety. Even in this type of apparatus concessions are being made to the demand for visual effect, and Morris Heating Appliances, Ltd., besides making their new "Central" electric hot-water radiator available in a number of attractive colours, have incorporated a mica panel through which shows a pleasing glow. The "Gee Gee" radiator (Geo. Green & Co.) is another type utilising water.

A stainless steel inset (James Smellie, Ltd.), the Tabard "C.S.14" wall panel with inset clock, and the "Lounge" mantel (Walker, Hunter & Co., Ltd.)



The "Bell" hook-on inset

Besides minimising blackening effect of dust upon walls, the shields available for Eastwood's radiators prevent radiation and loss of heat direct to the wall.

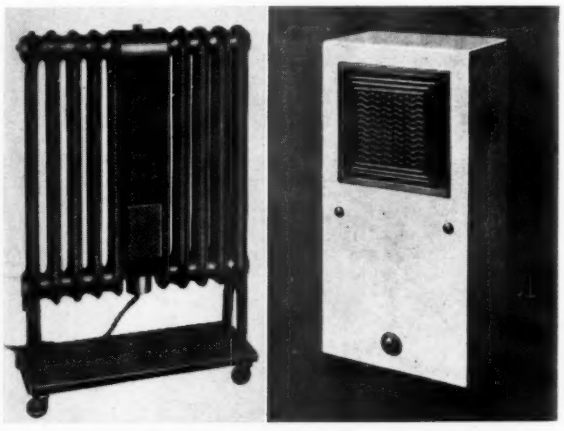
Paraffin stoves have inspired the design of the radiator of Dayanite Radiators. It incorporates a 600-W withdrawable immersion-type element, mounted vertically, which transmits heat *via* water to hollow metal vanes. The Bray portable radiators comprise strip heaters contained in a perforated metal case with cast-iron top and base, specially compact models being also available where space is limited.

The low-temperature heater such as is supplied by Messrs. Belling & Co., Ltd., for fixing under the seats of tramcars is just as useful for an airing cupboard or for taking a chill off a small room, while the small type of cast-iron bar or gilled air warmers often used for industrial purposes finds domestic applications in warming the garage or workshop.

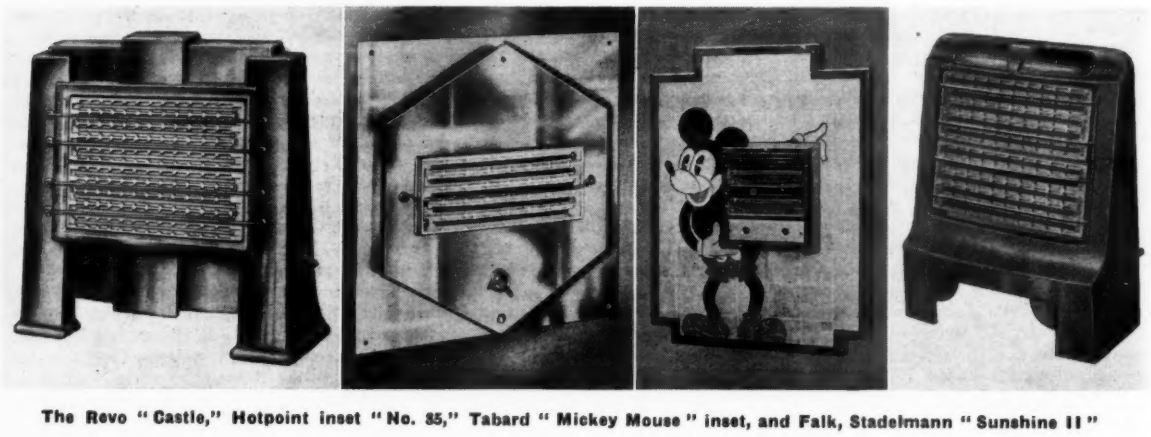
Where a constant temperature is required for a considerable period thermostatically controlled tubular heaters compete very favourably with other forms of heating both with regard to operating and installation cost. At present their principal domestic use is for entrance halls, garages and doctors' surgeries, but a better appreciation of their efficiency would no doubt further extend their applications. To-day this type of apparatus has become more or less standardised, so that the introduction of a flexible heater by the J. P. Tubular Heater Co., Ltd., arouses particular interest. Walsall Conduits, Ltd., are catering for the demand for portable heaters of this type, while Messrs. Falk, Stadelmann & Co., Ltd., have produced the "Efesca Surves" multi-unit heaters, which are installed vertically and can be screwed into the floor.

For garages and other places where there is a risk of fire Unity Heating, Ltd., has introduced new gas-tight and flame-proof tubular heaters. Both plain and gilled models are obtainable from Heatrae, Ltd., and, for the sake of economy and convenience in wiring, banks of the Revo heaters are interconnected by means of bus-bars contained in a combined wiring box and stand. A brochure received from Space Heating, Ltd., shows how to calculate tube-heating requirements for a room.

For providing a uniform heat all over the room panel-type heaters (such as the "Unity," "Revo" and "Xcel") have much to recommend them. They can be placed out of the way on the walls or ceiling and are very suitable for thermostatic control. The Unity Heating Co., Ltd., tells us that its skirting panels, which are unobtrusive and project only 1½ in., are growing in popularity; and the same company has just produced a new hot-water circulator which may be used in existing lay-outs as a booster or to replace an inefficient boiler.



The new Morris "Central" portable radiator and a Thermovent convector



The Revo "Castle," Hotpoint inset "No. 35," Tabard "Mickey Mouse" inset, and Falk, Stadelmann "Sunshine II"

A Wide Choice of Cooking Equipment

Information concerning the different types of cookers, hot plates, warming plates, kettles, toasters, etc.

SLOW boiling is still the subject of complaint. One reason for this is the production of cookers in which the only hob unit is a griller-boiler. This dual-purpose hot-plate cannot possibly give efficient service when put to one use only. We urge manufacturers to consider this question seriously. It is not of much use increasing hot-plate loadings if at the same time inefficient use of equipment is encouraged. Manufacturers who supply non-electric kettles with the declared objective of using the waste heat are obviously alive to the issue. With the development of higher loaded hot-plates during the past year have come calls for increased hob equipment, which had already been answered to some extent by the moves towards reduced dimensions.

In taking stock of the position we may recall the efforts of the Croydon Electricity Department to obtain three hot-plates and a grill within an area of 27 in. by 18 in. The model 95J produced by the Jackson Electric Stove Co., Ltd., is of the same size as model 94J within the 22⅝ in. by 22½ in. overall dimensions. Model 95J has an extra boiling plate. The H70 horizontal cooker made by Elexcel, Ltd., has a 2,000-W, a 1,200-W and a 650-W hot-plate in addition to a 1,500-W grill. The overall measurements are 23 in. by 49 in.

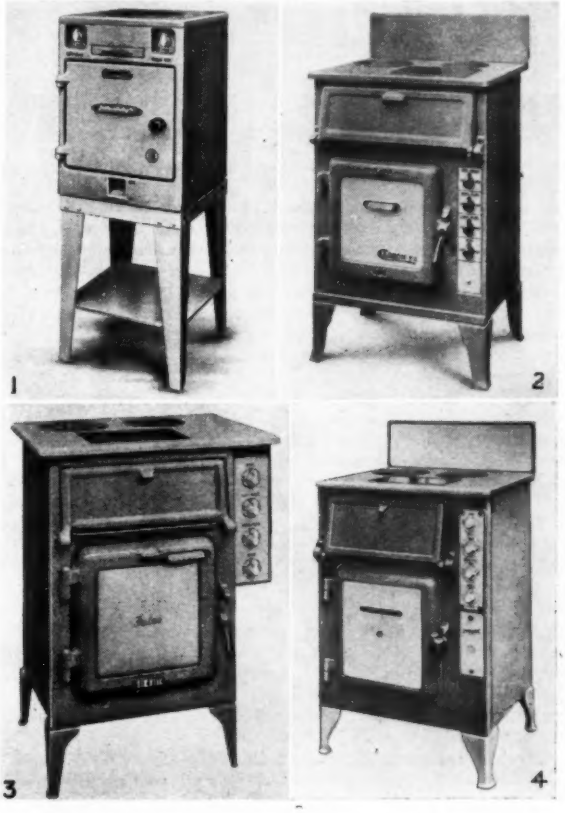
The R14 cooker produced by the Revo Electric Co., Ltd., with an oven measuring 15 in. by 15 in. by 14¾ in. (2,000 W) has two 1,800-W boiling-plates and one 2,200-W griller-boiler. No. 1 "Economy" cooker of the same make, with overall

1. Pressed-steel Tricity cooker. 2. The latest "Nippy" (B. & Y.). 3. No. DC 434 "Magnet." 4. A Walker Hunter cooker

dimensions of 18¼ in. by 17⅞ in., has a 1,600-W boiling-plate and a 1,500-W griller-boiler. A recent development of the English Electric Co., Ltd., is a flush-front cooker for the small house measuring 15 in. by 15¼ in. overall. It has a 1,600-W boiling plate and a 1,200-W grill in the top of the oven. In a cooker with a 10¾ in. by 11¾ in. by 11in. oven recently developed by British National Electrics, Ltd., there are two boiling plates (1,800 W and 1,000 W) and also a 1,800-W griller. Models 21M and 22M produced by Messrs. Moffats, Ltd., are the same except in that the latter has two 1,650-W plates against one only in the No. 21M. Both cookers measure 20¼ in. by 18¼ in. Similarly, of the two otherwise identical cookers recently introduced by Carron Company, model F2 has a 1,800-W and a 1,000-W boiling plate, as compared with the one 1,800-W boiling plate of model F1. The tops of both measure 24 in. by 20¼ in.

A particularly interesting comparison is that between two cookers manufactured by Tricity Cookers, Ltd. A recently introduced pressed-steel model has an oven (13¾ in. by 14¼ in. by 11¼ in., 1,500 W) of greater capacity than that of the larger cooker, No. 789, with its 13 in. by 12 in. by 13 in. oven (2,000 W.). The newer cooker has a 1,200-W boiling-plate and a small 4½-in. one for simmering, if required, in addition to a 1,800-W griller-boiler, while the larger cooker has a 2,000-W boiling-plate and a boiler-griller.

The desire for higher loadings led to such developments as the 2,250-W heavy embedded plate by the General Electric Co., Ltd., Simplex Electric Co., Ltd., and Revo. Now the



1. Flush-front English Electric model. 2. The Carron F.2. 3. Improved "Falco" cooker. 4. No. 6042 Hotpoint with "Torribar" hot-plates

G.E.C. has introduced a high-loaded radiant plate. This latest arrival has a loading of 1,800-W (8-in. model) and is of the hinged type. The Hotpoint Electric Appliance Co., Ltd., stresses the combined radiation and conduction heating of the "Torribar" (tube). The Metropolitan-Vickers Electrical Co., Ltd., talks of the higher speed due to less mass of its tube type, and Messrs. Walker Hunter & Co., Ltd., in referring to three new cookers, say "We have tried as far as possible to standardise on radiant boiling plates of Metropolitan-Vickers manufacture."

Another light-construction embedded plate is the "Chromalox" (Messrs. George Bray & Co., Ltd.), which, with its flat type rings, is available in four sizes up to 1,750 W (8½ in dia.), and is suitable for most home, colonial and Continental cookers.

The Westinghouse Electric International Co. markets an "Economiser" unit for which it claims, presumably on American cooker standards, saving of up to 40 per cent. in consumption. This plate appears to be of the non-embedded but light-metal covered type, like the "Cookquick" which is offered by Moffats. Any consideration of high loadings must embrace the Revo, Falk, Stadelmann, and Simplex transformer plates.

A complete change of outlook (or perhaps return to earlier ideas) is represented by the hob equipment on the new "Coronation" cooker of the British Development Co. This com-

prises one boiler-griller only which is not only of the really open type, but is larger in area and smaller in load (1,250 W). This, however, should be considered carefully with the other unusual features of the cooker.

As in the case of high loading ideas, the call for provision for simmering is associated with the suggestion that increased hob equipment might solve the problem, and this thought is fostered by the small simmering plate introduced by Tricity.

top of the interior plays an important part in the circulation scheme. Simplex attribute a good deal of the success of their exterior-element cookers as regards even heating to the application of heat all round the oven—top, bottom and sides—and the importance they attach to the oven interior being free from electrical parts supports the views of Edmundson's Electricity Corporation, Ltd., that to the housewife the oven should be a piece of non-electrical equipment.

Left: Elexcel table cooker. Centre: Model 21M (Moffats). Right: "Coronation" cooker (British Development Co.).

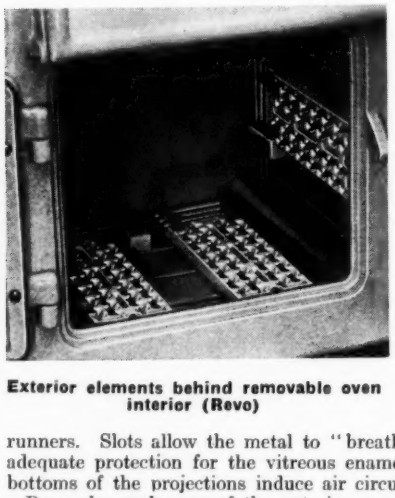
To forecast the final outcome of present simmering developments would be difficult, for with the heavy embedded plate alone there are four heats on the Revo and three on the Simplex "Triplate" patterns, each with limits of 2,250 W and 250 W and direct load switchings, while in the case of the G.E.C. plate the introduction of an external resistance by alternate switching on normal low heat results in the lower loading required. A neat plug-in resistor unit is incorporated in the five-way switch. There is now a four-heat "Torribar," and Hotpoint direct attention to the fact that the lighter construction of the plate makes possible a quick change-over from high to simmering heat. A simmering heat (120 W) is provided by the Westinghouse 2,000-W 8-in plate.

Oven Ventilation

In a new "Nippy" (Messrs. Berkeley & Young, Ltd.), there is a low-loaded bottom oven element, and we are informed that this serves as an efficient simmering unit.

A more important point about this heating component is, we think, its relationship to oven-ventilation ideas. Side apertures in the metal casing of the element unit induce circulation of air up through the element to an inverted-tray type surround from which it escapes to the oven *via* corner holes. Carron are among manufacturers who stress the importance of the relationship of even oven temperature to proper ventilation.

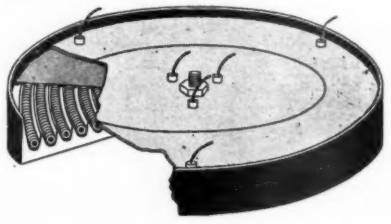
Most of the modern ideas on this score, however, embrace the exterior-element scheme. The small cooker introduced this year by Messrs. Belling & Co., Ltd., has a large area element under the fixed oven interior. Air drawn through holes at the bottom of the cooker is passed through the heater spirals and deflected out through the space under the front bottom lip of the interior to be then directed into the oven. The latest cookers introduced by Messrs. Falk, Stadelmann & Co., Ltd., have steatite-threaded exterior units housed in grooves formed on the outside of the oven interior by inwardly projecting shelf runners. Slots allow the metal to "breathe," thus affording adequate protection for the vitreous enamel, and the sloping bottoms of the projections induce air circulation.

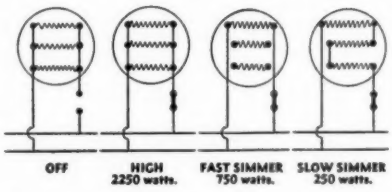


Exterior elements behind removable oven interior (Revo)

Revo also make use of the exterior-oven element idea, but in connection with an older conception of cooker design, namely, the removable-oven interior. In models R4 and R8 the open

One of the ovens of the "Coronation" B.D.C. cooker has its elements actually wound round the oven interior, a constructional method which has certainly proved highly successful in some kinds of small industrial furnace. The loading is 1,250 W and the oven capacity is given as six 2-lb. loaves. Mr. Hurry (Jackson) has spoken to us of the importance of aiming at cooking *capacity* rather than loosely at cooking *space*. A design feature of the Jackson cookers is that the position of the oven elements permits food to be cooked actually on the floor of the ovens. The "Coronation" cooker oven referred to is equipped for thermostatic control, and we suggest that nowadays adequate consideration of uniform temperature and air circulation cannot be separated entirely from that of automatic control.





Switching arrangements for high and simmering load "Creda Tri-plate"

Automatic Control

Generally speaking, manufacturers continue the approach to automatic control very cautiously indeed. The most recent entry into the field is the G.E.C., who say that extensive tests they have carried out at Wembley point to advantages in a number of ways. The company has produced a thermostat which can be fitted to any of its own home models. Work is proceeding on a second thermostat for overseas cookers. The advantages credited to automatic control by the G.E.C. are uniformity of cooking on different days by inexperienced cooks, perfect long-period, low-temperature cooking such as is required for Christmas cakes, and greater accuracy in oven temperature, especially when cooling from a higher temperature, upon inserting fresh articles to be cooked. Among others, Elexcel, Belling and Moffats all feature automatic control, and Belling's attach importance to the idea of the cook leaving the oven to do its work alone while she goes shopping.

The Falkirk Iron Co., Ltd., has introduced a revised model of its No. 5,350 cooker. The grill door is a one-piece casting, and the cast crownplate has high sides to ensure that no spillage reaches the lagging. A griller-boiler is also a new feature.

A good deal of confusion exists in engineers' and consumers' minds as the results of claims made on the score of economy for certain unorthodox types described as "low-temperature" cooking equipment. If it is the mass cooking scheme which

is really meant, the principle is not new, and we have only to remind many of our readers of the impressive cooking demonstrations carried out by Jacksons and the G.E.C. Any housewife can pack the oven of a well-designed cooker with specially selected dishes on the same principle, not only for long-period, low-temperature treatment but also for cooking at high temperature. An Elexcel catalogue depicts a roast chicken, roast potatoes, a casserole of peas and stewed dried apricots heat treated from 5.30 p.m. to 6.45 p.m. at 450 deg. F. with good results. We have no fault to find with unorthodox designs, but wish to make clear the difference between the two classes of cooking equipment.

Flexibility is the keynote of the ordinary cooker designed for the British home, for which boiling and baking are called for in all manner of quantities and times, often in emergency. Cooking did not begin to make headway until supply men and manufacturers appreciated that utility was at least as important as thermal efficiency.

An outstanding example of this "mass cooking" equipment is the rectangular roaster marketed by Westinghouse. It is loaded at 1,200 W and has an overall capacity of 13 quarts. Three glass dishes which nest in the main container facilitate the cooking. The equipment is fitted for thermostatic control between the limits of 150 deg. F. and 550 deg. F.

Two other types are the steam cooker produced by Messrs. Bulpitt & Sons, Ltd., and the "Pyramid Economy" steam cooker manufactured by Messrs. Hague & McKenzie, Ltd. They are both of the tiered saucepan construction, but whereas the Bulpitt unit is self-contained with two separate immersion elements (700 W and 400 W) in the bottom of the lower pan, the "Pyramid" equipment is specially designed with a thick machined bottom for use on solid hot-plates, in common with a wide range of normal hot-plate utensils.

In addition, there is the waterless type of cooker produced by the British Development Co., which is loaded at 700 W and will deal with, for example, a 5-lb. roast chicken, roast potatoes, steamed vegetables, steamed fish and also a sponge pudding.

Such a waterless cooker is embodied in the "Coronation" model of the same make, and the idea is to provide low-temperature (mass) cooking for smaller quantities of food than can be dealt with by the larger oven so economically. There is a second oven in this cooker under the large-area open boiling plate which can be covered in by an insulated lid like those used on thermal-storage cookers. Here again, the object is economy by the use of a smaller component at times of lower demand. The "Emperor" (Westinghouse) has one oven which will hold a 25-lb. turkey and a smaller oven for baking. It is said that a special appeal is made to the housewife by the exceptional table space afforded by the drop-down doors of these dual-oven and similar cookers. Table-top space is certainly being given more attention, and Moffat's 31M, for example, with the hob cover and the oven on the same level, provides excellent table facilities.

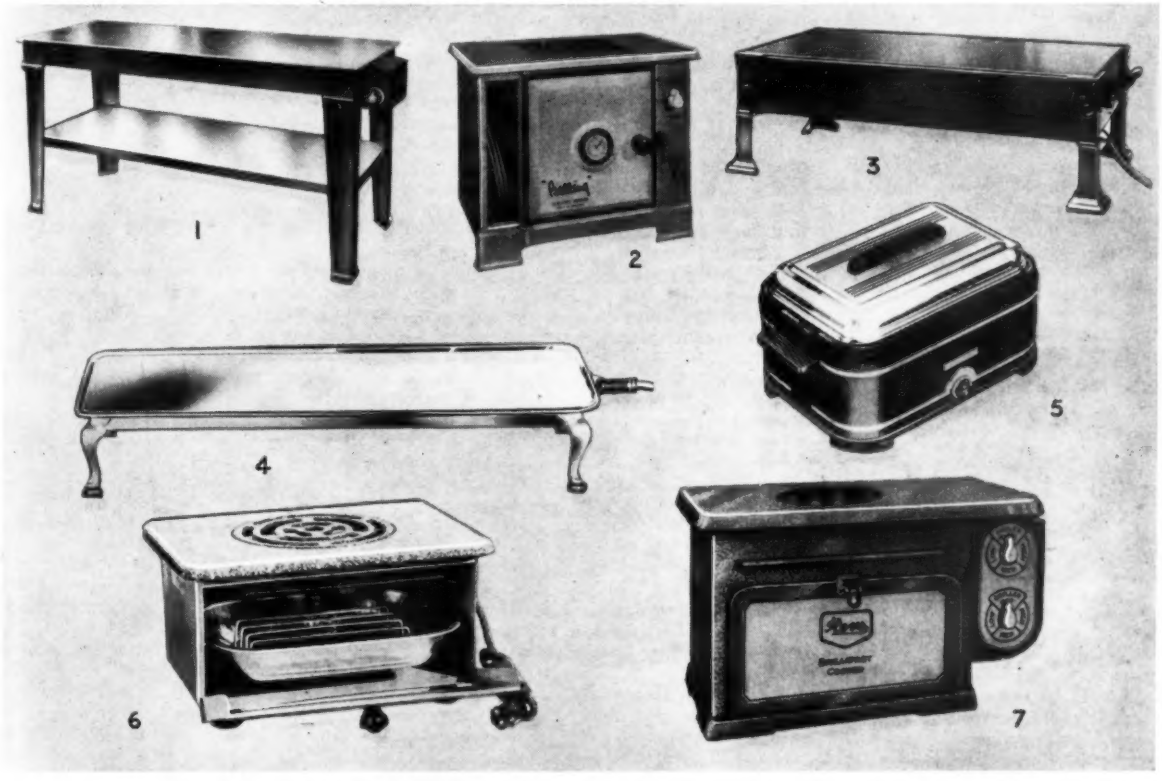
The table-top space idea is often associated with the table type or horizontal cooker, with the oven and hob portions side by side. We learn that the No. 90J Jackson will soon be available with the oven and hob portions separated for use side by side on a table or stand. The light construction table boiler-griller and oven produced by the Arora Company are available with suitable stands for use side by side as a horizontal cooker or in tier formation as a vertical cooker.

Associated with the table-area scheme is the provision of a shelf under the vertical cooker. A good example of this is found in the H320 model of Messrs. Siemens Electric Lamps & Supplies, Ltd., which has an oven 11 in. by 12 in. by 13 in., a griller-boiler and one hot-plate.

Breakfast Cookers

We should like to see a form of classification of breakfast cookers. Some models, with a separate grill in addition to a hot-plate, are superior in performance to the baby-type cookers, while other breakfast cookers are almost indistinguishable from table-boiler type equipment. There seems to be little, if any, recognised line of development as to dimensions and loadings. Some breakfast cookers with doors provide quite efficient oven service; we have seen a Revo model fitted with a thermostat and giving satisfactory service on test. The highest loaded breakfast cooker that we have seen is that of British National Electrics, which has two boiling plates (1,800 W and 1,000 W) and a 1,800-W grill. It measures 12 in. by 19¾ in. by 12¼ in., and has no door. Another of the same make has a 1,800-W solid griller-boiler and also a door. While the Carron B2, with a 2,000-W boiling plate, a 1,500-W grill and a 6¼ in. by 11¾ in. by 12 in. chamber has no door, model B1, with a 2,000-W griller-boiler only and an 11 in. by 18½ in. by 10 in. chamber has a door. There is a Simplex equipment (4 in. by 11 in. by 9½ in. oven) with a 1,800-W boiling plate and a 1,500-W grill. A Revo unit with an 11½ in. by 6 in. by 9 in. oven has a 1,200-W hot-plate and an 800-W grill.

Two-kW griller-boilers are common to breakfast cookers produced by Messrs. Albert Phillips, Ltd., Walker Hunter, Belling, Elexcel, Siemens, English Electric and B.N.E. The last-mentioned model has an embedded tubular element with three separate sections arranged for four-heat control by a four-way and a two-way switch. The E.E. unit is styled a semi-luminous grill hot-plate. It is a modification of the earlier open-protected equipment.



1. Table model heavy-duty warming plate (Heatrae). 2. The Belling No. 40. 3. An Arora warming plate. 4. Hotpoint warming plate. 5. Westinghouse "mass cookery" roaster. 6. The Vidor breakfast cooker. 7. Revo breakfast cooker

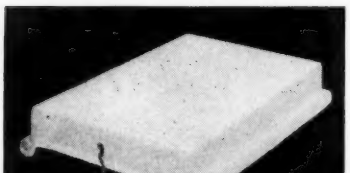
E

The Siemens breakfast cooker has a one-piece cast body, including the switch-plate extension. The Elexcel unit is available with or without a door, while the Belling and Walker Hunter models afford interesting cooking space comparisons of 10½ in. by 10½ in. by 4¾ in. and 12 in. by 8 in. by 10 in. A Berkeley & Young breakfast cooker is notable for its light construction, and it has a 1,800-W boiler-griller. The "Crescent" (Phillips) is a light unit complete with a door, and it is not intended for boiling. The low load "open griller-boiler" serves for normal grilling and top simmering. Two breakfast cookers produced by Vidor, Ltd., have low loaded semi-open boiler-grillers (1,000 W and 750 W), and are styled "early morning time savers."

Much confusion still exists in the classification of table-type boiling and warming equipments, which include "tables" with actual hot-plates for normal boiling and "tables" in which high-load or low-load elements "cover" a large table-top area. One of the most interesting ranges of boiling rings embraces the following Phillips units: a 6½-in. dia., 650-W, "open" element; a 7½-in. dia., 1,000-W, protected element; and a 10-in. dia., 1,550-W, two-ring light embedded plate. In one-piece castings there are Simplex 20-in. by 11-in. "tables" with two 1,800-W plates, while simple light-construction rings of the same make and with worked metal legs are available in open (1,000 W) and closed (500 to 1,800 W) types.

The "Multi-boiler" of Premier Electric Heaters, Ltd., reminds us of the present simmering controversy in connection with ordinary cookers, because of the provision for drawing utensils aside for simmering, there being an extending ring round the 1,500-W hot-plate. The term "2,000-W hot-plate" is used for the Westinghouse table which is actually equipped with two 1,000-W hot-plates.

Last year we commented on the need for a better distinction between the mainly utility class of table equipment and appliances which, by their attractive appearance and artistic design, are specially suitable for use on the dining table and sideboard. Now there are more references to table and sideboard use, not only in connection with essentially warming plates, but also with other table ware to be referred to later in this article.



Warming plate with elements embedded in refractory (Catterson-Smith)

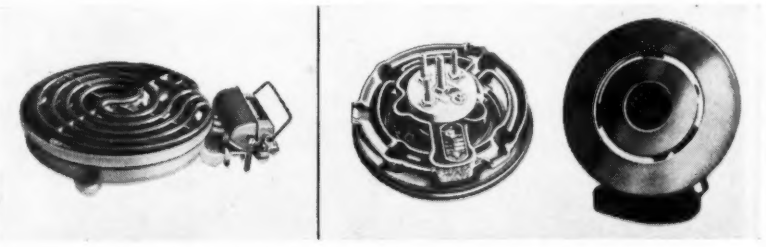
A 36-in. by 12 in. 600-W warming plate produced by Heatrae, Ltd. (nickel or chromium plated), has a thick aluminium top with a matt surface. Premier Heaters make handsome c.p. or n.p. warming plates (15 in. by 45 in., 720 W) and also a plate finished in "Kolkraft" enamelling. It is claimed that the latter will stand up to 300 deg. F. which, in view of the white-base finish, is very good. In solid brass there is a 225-W (30-in. by 10-in.) Phillips plate with two switches. Other attractive units are the G.E.C. (24 in. by 12 in., 400 W) and the Arora (18 in. by 9 in., 170 W) warming plates. A new note is struck by the small 100-W Heatrae plate complete with a cover to take an individual dinner plate.

Perhaps the most interesting warming plate of all is that for which Mr. R. M. Catterson-Smith is responsible. The body is the actual refractory in which the elements are embedded, and the colouring to choice renders it excellent table ware. A circular model is loaded at 100 W and a rectangular model at 200 W.

By way of contrast there are the definitely utility heavy-duty Heatrae hot-plates (36 in. by 24 in., 2,000 W) and industrial-type hot-plates (24 in. by 18 in., 4 kW) which give a maximum surface temperature of 600 deg. F. on a prolonged run.

With regard to kettles, the following have 1,000-W loadings: Premier, Revo, and E.R. Company, 3 pints; Sloan Electrical Co., Ltd., 3½ pints; Arora, 4 pints; and Cooper Stewart Engineering Co., Ltd., 5½ pints. A 6-pint Premier is loaded at 1,350 W, a 3½-pint Cooper Stewart at 1,200 W, a 2½-pint Moseley at 850 W, and a 2-pint Phillips at 650 W. We have heard the Bulpitt combined kettle and saucepan commended, and we have also heard complaints that the two-heat element does not appear to be available in ordinary kettles.

Referring to its clamped element kettle, the G.E.C. makes a point of its being able to boil without boiling over when filled to the rated capacity. Automatic re-setting as well as automatic cut-off is a feature of a Hotpoint kettle, and a family size unit of this make (5 pints, 2,100 W) has a hinged lid for easy filling.



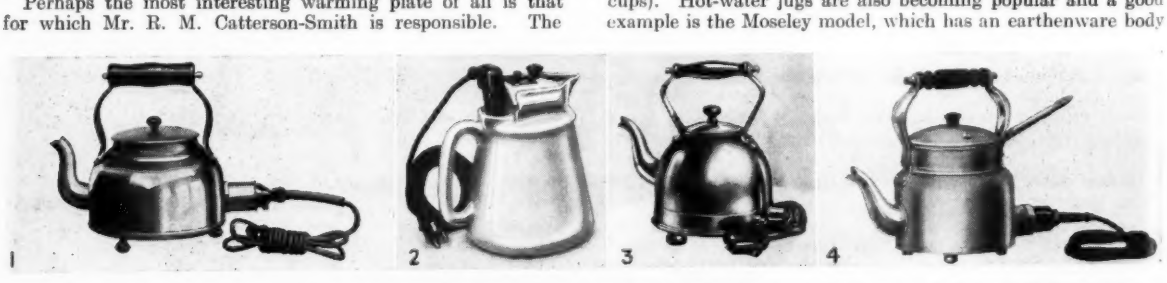
Left: G.E.C. radiant hot-plate. Right. "Chromalox" hot-plate

When the water in the "Rockit" kettle of Messrs. George Green & Co., Ltd., is reduced to a certain level the kettle tilts and operates a spring-actuated plunger cut-off. Messrs. George Bray supply a highly successful cartridge immersion heater which simplifies kettle construction. A Siemens kettle has a one-piece body without joints. The unusual "Afternoon Tea" Simplex kettle will grace any tea table.

There are many toasters on the market, but they have much in common. In the following review the principle features of various makes are given. The Phillips model has a brass base; the B.N.E. "Double Quick Oven" toaster toasts both sides of two slices at a time; the "Handyhot" (Messrs. Guiterman & Co., Ltd.) is unusual and modernistic; the glass sides of the Hotpoint solve the cleaning problem; the Cooper-Stewart model toasts in a horizontal position; the "hygienic" toaster is specially designed to prevent the accumulation of crumbs; Bulpitt's "8.30" automatically turns two slices at once; a G.E.C. equipment toasts two slices in three minutes; sixty slices for one kWh is claimed for the Mosely toaster; a unit sold by the Ormond Engineering Co., Ltd., is very low priced; there is a heavy-gauge Siemens toaster in n.p. or c.p.

A survey of electric cooking equipment would not be complete without a reference to the utensils specially designed for use on solid hot-plates. The latest development is the nest of three saucepans, each of segmental shape, which fit together to form a circle of the same diameter as the hot-plate. Messrs. Corfield-Sigg & Co., Ltd., and Hague & McKenzie both have equipment of this description listed.

A development of the attractive tableware idea is the breakfast set sold by Messrs. Bulpitt. Complete with the toaster are a c.p. toast rack and a similar tray. There is also a Westinghouse toaster set with a toaster, tray and a set of crystal-glass relish dishes. The Premier coffee percolator with its solid copper body finished n.p. or c.p. outside and silver plated inside, is typical of this class of equipment (400 W, eight cups). Hot-water jugs are also becoming popular and a good example is the Moseley model, which has an earthenware body and is loaded at 1,000 W (four pints). The Cooper-Stewart "Quick Boiler" is described as of ceramic design (3½ pints, 120 W). More attention might be given to the portable immersion heater for warming liquids by simply immersing it like a spoon. Such appliances are produced by Messrs. Ward & Goldstone, Ltd., a 9-in. model being loaded at 300 W.



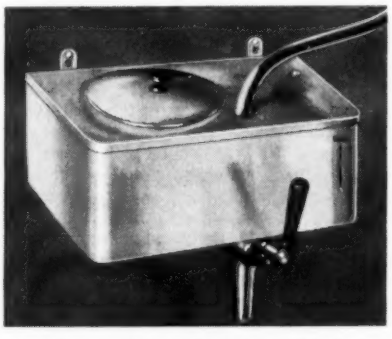
1. A Sloan Electrical product. 2. Electric hot-water jug (H. G. Moseley & Co., Ltd.). 3. A Premier kettle. 4. Bulpitt combined kettle and saucepan

Water Heating Methods and Apparatus

A regular supply of hot water is invaluable and constitutes a desirable load for the electricity undertaking

WHILE Messrs. Santon, Ltd., consider that the geyser offers the simplest and most efficient method of heating water, the General Electric Co., Ltd., favours the pressure-type thermal-storage heater, with full automatic control, serving the whole house. Electric automatic control stands out as a conspicuous success in the field of domestic water heating; it ensures constant hot water to the consumer and assists the supply engineer to level up his load.

There is a tendency to increase loadings. Does this signify a trend towards geyser heating, or is it a temporary measure to fill the gap in those fields where the development of the present-day thermal-storage heater must necessarily be slower or delayed? Of course, it may point to the changed conditions of electricity supply, and, if so, can we not now have higher loadings than, say, 500 W for a 5-gallon thermal-storage heater?



Berry's "Quick Safe" auto-boiler

The circulator, with its directing tube which hastens the rise of heated water to the top of the tank, is responsible in one form or another for practically all moves towards obtaining small quantities of hot water immediately after switching on, whether in self-contained heaters or in converted tanks. Departures from the usual construction with the element and thermostat all within the circulating tube are the J. & P. and Heatrae units. The former has a circulating tube of D section and the thermostat is outside the tube, resting along the flat portion, but is within the normal screw head. The object of the very large outlet holes is to reduce furring (18-in. immersed length, 1 kW). The thermostat of the Heatrae unit is also outside the tube, but is housed in a groove in the tube (22 in., 1.5 kW).

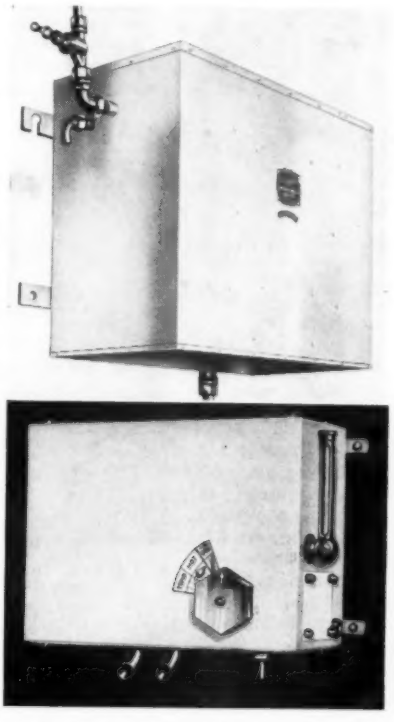
The Simplex circulator differs from general construction in that the water path is actually surrounded by the element. The result is a greatly increased dissipating area, reduced surface temperature, and hence less furring. A useful circulator development is the provision of two loadings, a high one with hand control for heating large quantities of water quickly and a smaller one with automatic control for "base" heating. One example is the Santon "Duo-Circ-Stat," which consists essentially of long and short elements within the circulator tube. In a 42-in. tube the loadings are 3 kW and 500 W. A constant loading of 500 W is also provided in the similar "High-low" equipment, while another product of the same makers is the horizontal circulator, which has proved so successful in the North, where the existing copper tanks provide little head room. The horizontal unit proper is fixed at a slight angle and at the inner end there is a vertical direction tube.

The Arora Company and G.E.C. each market an external circulator for coupling in the existing flow-and-return circuits of water-heater systems.

The Glasgow electricity undertaking assesses the value of the thermal-storage heater by the increase in the use of hot water which it automatically brings about. At present, however, the domestic use of hot water varies very widely indeed, and the present thermal-storage heater will not cater satisfactorily for all types of consumer. Hence the introduction of such terms as "semi-storage" and "semi-geyser," and, more particularly, the unlagged high-loaded hand-controlled type of heater such as that introduced by Messrs. Ferranti, Ltd., which is cylindrical, holds 12 gal. and is loaded at 3 or 4 kW.

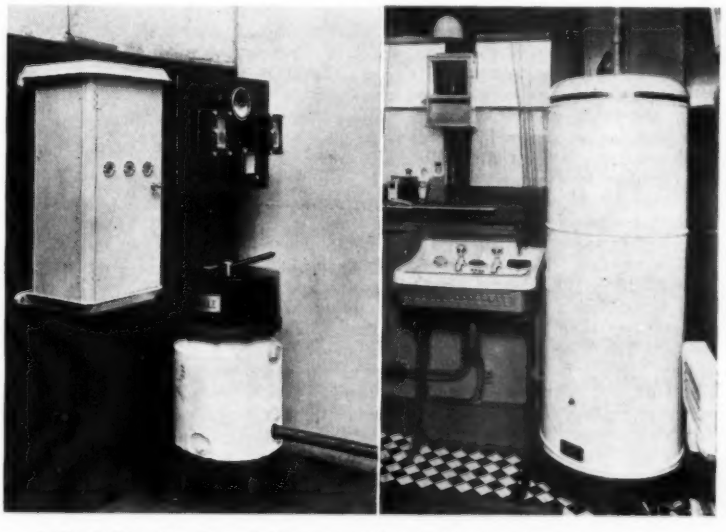
The "Quick Service" non-pressure unlagged hand-controlled cylinder produced by Heatrae, Ltd., has a capacity of 12 gal. (4 kW); the Simplex Electric Co., Ltd., has a "Rapid" unlagged bath-water heater; while in similar sizes and loads there are rectangular types with hand control and broken feeds produced by Messrs. Benham & Sons, Ltd.

The Santon "Soon-Hot" is also hand controlled, and its internal circulating system will provide sufficient water for a bath in three-quarters of an hour. The 10-gal. size is loaded at 4 kW. The "York" heater of the same make, which is said to have nearly the speed of a geyser and to provide sufficient water for a bath, has a ball-valve control actually within the container. Similarly, Messrs. George Green & Co., Ltd., provide the ball-tap directly in the hot chamber in one of their "Artisan" heaters (12 gal., 3 kW). The other model has a separate cold-water chamber.



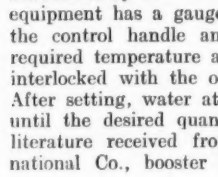
Above: Rectangular gravity type (Bastian & Allen). Below: Eastwood's "WGJ" storage geyser

Messrs. Johnson & Phillips, Ltd., in their high-load "Charlton" (4 kW), seem to aim at a halfway house on the efficiency idea by providing just a light lagging of ¾-in. in thickness. To provide loading to suit the output sounds almost too good to be true, but it indicates the progressive line of development of Messrs. Bastian & Allen, Ltd., whose rectangular heaters (5 to 40 gal.) are loaded "according to their 24-hours output." They are designed for actual installation requirements. Two kW for 3 and 5½ gal., 3 kW for 9 gal., and 4 kW for 12 gal. are the loadings represented by the hand-switching non-pressure heaters produced by the Geyser Manufacturing Co. (1932), Ltd. All capacities are available as cylindrical models and the two largest sizes in D and angle patterns.



Left: A Reyrolle electrode boiler. Right: A 20-gal. "Magnet" heater

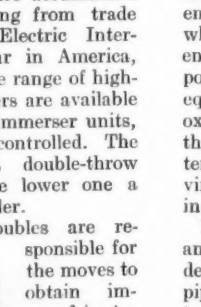
An effort to couple the advantages of thermal-storage and geyser heating is represented by the automatic storage heaters introduced by Messrs. Eastwoods, Ltd. Loaded at 3 kW, the equipment has a gauge marked in pints to one gallon, and the control handle and scale are marked for setting the required temperature and quantity of water. The control is interlocked with the outlet valve and switch in the heater. After setting, water at the selected temperature accumulates until the desired quantity is reached. Judging from trade literature received from the Westinghouse Electric International Co., booster heating is also popular in America, for all of a very large range of high-capacity water heaters are available equipped with two immerser units, both automatically controlled. The upper one has a double-throw thermostat, and the lower one a single-throw controller.



"Gee-Gee" One-Point" equipment

Slow-recovery troubles are responsible for the moves to obtain immediate small quantities of hot water. Referring to their pressure heater, used in conjunction with a fuel-fired system, Messrs. Ferranti say it has a recovery period of from 50 deg. F to 190 deg. F. in four hours when the coal fire is not in use. The small "Quick Service" unit of the Jackson Electric Stove Co., Ltd., is designed to afford instantaneous supplies of hot water in small quantities. The Bastian & Allen gravity water heaters referred to are so designed that any of the water they contain is within 10 deg. F. of the thermostat setting. The English Electric Co., Ltd., incorporates in its non-pressure heater a short element with a case fitted with fins, with the result that increased circulation and equalised temperature are achieved. There is about 5 deg. temperature difference between the top and bottom of the heater, as compared with a normal difference of 40 deg. F. Placing the thermostat in the cold-water inlet aids quick recovery by reason of its immediate action.

A domed heater (Berry's)



"Xcel" broken-feed heater

The water heaters produced by Messrs. A. Reyrolle & Co., Ltd., all have short elements at the bottom so as to ensure that the greatest possible amount of hot water is available.

Both the English Electric and Reyrolle schemes result in increased heat-emission areas of the units, and Messrs. Reyrolle mention a low surface loading of 9.5 W per sq. in. It is now fairly generally accepted that increasing the emission area, so as to avoid boiling, with consequent deposition at the surface, is the right method of overcoming scaling.

A notable development of this idea is indirect heating, as employed by Aidas Electric, Ltd. An ordinary immersion heater is contained in a large copper sheath in which the intervening space is filled with a mineral-oil base compound held in vacuum. Heat generation results in melting the compound and in rapid liquid circulation and consequent speedy heat transmission to the sheath, the temperature of which is never more than 12 deg. F. above that of the surrounding water. The "Scallak" element unit developed by Messrs. George Bray & Co., Ltd., also operates on the indirect-heating principle, but with water as the transmitting medium. The separate heating chamber of the element unit is automatically filled with water when it is put into service, and evaporation losses are prevented, but circulation between the water in the heating chamber and that in the container is impossible.

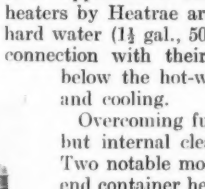
Modifications of the "Scallak" cap render it suitable for both pressure and displacement heaters, the type for the pressure heater embodying a U tube. This anti-furring element unit is used in the "Scallak" water heaters produced by Messrs. Archibald Low Electrics, Ltd., which are available in 1½- and 5-gal. capacities, both loaded at 500 W.

Theoretically, of course, all element units, except those in which the actual resistor is in contact with the water, heat on the indirect principle, but not with the same idea behind their design. We have in mind an embedded-type element in connection with which we have heard no claims as regards anti-furring nor the term indirect heating. But the emission area seems to us to be quite large. We refer to the "Magnet" embedded element, in which the nichrome spirals are first embedded in refractory in grooves in a cast-iron former, the whole being packed in aluminium and silicon alloy suitably encased. The "Torribar" heating unit employed by the Hotpoint Electric Appliance Co., Ltd., is another embedded equipment with the resistor within rock-hard magnesium-oxide, all in a solid-drawn copper tube, with the result that the core temperature is very little higher than the surface temperature. This construction is said to render the heater virtually indestructible and to transmit heat to the liquid in a minimum of time.

But furring troubles are not confined to the element units, and we learn of the "Portsmouth" Sadia which has been designed to eliminate fur in the outlet pipe by exposing this pipe to the atmosphere. A tube from the top outlet is taken to a copper union near the base of the heater. Top outlet heaters by Heatrae are also designed essentially for use with hard water (1½ gal., 500 and 750 W). Benham's emphasise in connection with their cistern heaters the cold-water entry below the hot-water circulation, so minimising furring and cooling.

Overcoming furring troubles will reduce maintenance, but internal cleaning is likely to be always necessary. Two notable moves to facilitate cleaning are the domed-end container heater produced by Berry's Electric, Ltd., and the "Gee-Gee (George Green & Co.) One-Point" heater. The copper container of the former is seamless, the usual apparatus plate is eliminated, the only joint is a washered flanged junction, and the inside surface offers no obstruction to cleaning operations. There is a removable apparatus plate at the top which gives increased accessibility. Another maintenance-reducing idea is a special "breathing" device which English Electric fit in the top of their heater to prevent the lagging from sweating.

A survey of some of the loadings adopted for normal automatic storage heaters proves rather surprising for heaters of the same size. There seems to be no reason, for, indeed, there is no marked difference, for variations in the loadings of different classes of heaters, and the following figures are taken at random irrespective of the type of equipment. There are E.E., G.E.C. and Aidas 1½-gal. equipments loaded at 500 W, an Elexcel unit of the same size at 600 W and Ferranti and Reyrolle 1½-gal. heaters at 750 W. A 5-gal. heating-equipment comparison shows a Simplex 500 W, Arora 750 W and Ferranti and Eastwoods 1,000 W. English Electric and "Xcel" 12-gal. heaters are loaded at 1,000 W and 1,200 W, respectively, and a 20-gal. Reyrolle, a 30-gal. Jackson and a 100-gal. Heatrae are loaded at 2 kW, 2.5 kW and 6 kW, respectively.



A cylindrical unit (Geyser Mfg. Co.)

Most manufacturers have now adopted the terms "pressure," "non-pressure" and "cistern" for the three main types of heater, which is all to the good. But unfortunately such terms as "displacement" and "push-through" are still common. Judging from comments we have heard from some supply men, even the terms "pressure" and "non-pressure" are not fully understood. It seems that the term pressure implies to some minds water-main pressure, whereas, to quote Messrs. Reyrolle, the pressure heater will serve for more than one tap and can be connected to a ball-valve tank. Thus the pressure now implied is that induced by the head of water from the cistern feeding tank.

Heatrae say that their pressure heaters are designed for a normal working head of 50 ft. (25-lb. pressure) and that the heaters are tested to 50-lb. pressure. The pressure anomaly is emphasised by a reference by the same company to the method of preventing possible damage by *excess pressure* in their *non-pressure* heaters should the outlet become inadvertently closed. The remedy is a double-acting relief valve. The non-pressure heater is designed for free outlet work, and, operating on the push-through principle, direct connection to

the water supply undertaking's main is permissible as a rule.

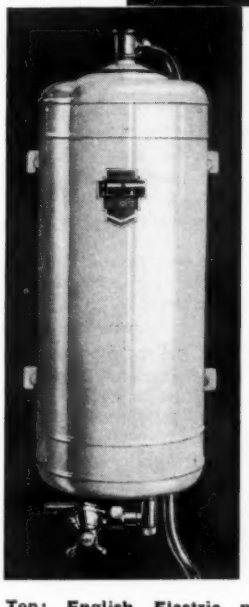
Where direct connection is not permitted the difficulty is overcome by broken-feed models, usually with a funnel into which the feed is directed. A good example is the broken-feed equipment marketed by the Simplex Electric Co., Ltd. The broken-feed heater of Elexcel, Ltd., has an air vent in addition to the funnel to equalise pressure, while the standard non-pressure heater of the same make has an anti-siphonic U tube non-return pipe in the water container. This company points out the advisability of ascertaining the local regulations as to the connection of bottom inlet tanks before business is transacted.

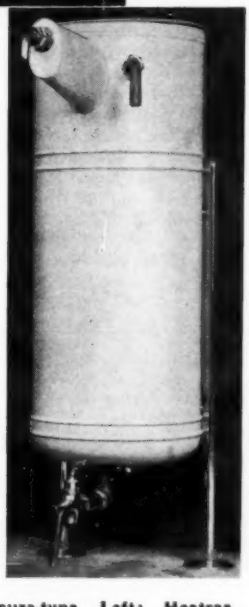
The G.E.C. stresses the necessity of taking precautions to prevent the possibility of the storage tank becoming empty in the event of a water-supply failure. The cistern type of heater is merely a move to obtain the advantages of a multiple-outlet heater where there is no cold-water cistern feed available.

There is a common design in three types of heater produced by the Arora Company, which are described as: (1) with a feed from a ball-valve tank and a free outlet; (2) with a feed from a ball-valve tank and an expansion pipe for several taps; and (3) for direct connection to water main and with a free outlet and a non-return device. Particularly with cistern-type heaters rectangular models are becoming quite common nowadays, mainly on the score of space saving. Actually there is no real space saving in any shape of heater as compared with another shape of the same size. It is the reduced projection that counts in the case of the wall-mounted heater, and Santon point out that the less the projection the greater the wall space occupied. As part of their wide range of cistern heaters of up to 100-gal. capacity, Simplex produce rectangular models in sizes from 5 to 30 gal. They are recommended for use only where a separate supply system is not available, and they must be installed above the level of the highest water tap.

A squat cistern equipment has been introduced by Heatrae for use where there is little head room. It is described as a complete water system, and its outer casing is of wood. The smallest size measures 35 in. by 29 in. by 22 in. high. The cistern heater designed for ceiling suspension is rather similar to the last-described equipment. It offers many advantages by way of wall-space saving, and a good example is that introduced by Johnson & Phillips at the I.M.E.A. Exhibition this year.

A table-pattern Heatrae pressure heater is another space-saving idea, and a further special-purpose equipment of this company is a non-pressure heater with a sub-outlet. The normal outlet is essentially "open," while the branch service with taps can draw water from the heater to about one-third the distance down the tank. This heater is merely intended for those cases where adequate normal service cannot be provided.





Top: English Electric pressure-type. Left: Heatrae "T0Z" top-outlet heater. Right: Ferranti hotel-bar model

The electric water heater can add substantially to the utility of a fuel-fired boiler. Probably the most satisfactory equipment to this end is the reasonably large pressure-type heater, and by a little special attention to details the standard equipment is rendered particularly suitable for this purpose. The Ferranti equipment, with its provision for direct connection to the coal-fired boiler, is a good example. There are right- and left-hand fixings for the hot-water circulating pipe, elbow unions and tail pieces for the hot-water outlet and circulating pipes, a T-piece for the cold feed and a return circulating pipe. In common with other Ferranti heaters of the larger sizes this 20-gal. equipment, loaded at 2,000 W, is equipped with horizontal elements.

Elexcel offer a few interesting installation hints in connection with the use of their pressure-type heaters in conjunction with fuel-fired systems. The equipment must not be connected in the flow and return pipes, but to the top outlet of the existing cylinder. Water flows from the existing system to the electric heater, with the result that when the kitchen fire is alight the water is warm before it reaches the heater, and when the fire is out the electric heater maintains the hot-water supply without warming the kitchen. The "Reymez" combined storage heater and wash-basin (Reyrolle's) may not perhaps be special-purpose equipment from the strictly utility point of view, but it appears to overcome certain objections æsthetically and it is certainly ideal equipment for the bedroom. One cold-water connection only is required, instead of the three pipes which are usually necessary. The heater is concealed in the basin pedestal and is normal automatic equipment.

Another special service heater is the "San-Spray" (Santon), which is said to offer ideal bath service which is more economical in both water and electricity. It has an adjustable automatic cut-out, and water mixing is simple. One model embodies a 1,000-W thermal-storage heater and the other a 3-kW thermal-storage unit. There is a close link between water heating and space heating where the latter is provided by hot-water circulating systems.

With to-day's development of residential flats hot-water space heating is definitely entering the domestic field, and two types of equipment are particularly suitable for this service—the electrode boiler and the tank fitted with banks of immersers. Good examples of the former class of equipment are the Reyrolle boilers, which are available in sizes as low as 10 kW. These three-phase equipments are hand regulated and, because the water itself is the heating element, "burn-outs" are eliminated and an efficiency of 98 per cent. is obtained. Heatrae list a range of galvanised-steel tanks fitted with banks of immersers designed for really heavy duty. They are made from plate $\frac{7}{8}$ in. to 1 in. thick. The heater banks occupy a relatively large portion of the tank space, so that the equipment acts more as a circulator for the system as a whole.

It is good to see that the containers of most 1½-gal. water heaters are now tinned.

The Berry "Quick Safe Auto Boiler" is fitted to the outlet of a normal water heater. The tap of the heater controls the flow through the boiler. Boiling water is obtained in two minutes, but if only warm water is required the tap on the "Auto Boiler" is left open and the water is passed straight through it. A mercury switch governs the element and is float controlled. The Ferranti "Hotel Bar" heater presents another idea for encouraging water heating for cooking. It has a tinned container, a built-in ball valve and a draw-off tap for a pipette nozzle which allows very small quantities to be drawn off. This 1½-gal. thermostatically controlled equipment is loaded at 750 W.

There has been a phenomenal demand for conversion equipment during the past few years and there is now a very wide range of immersion heaters and circulators. Among the immersers the withdrawable and blade types produced by the G.E.C. are representative. In the withdrawable type the tubular container remains fixed in the tank, while the whole unit is a fixture in the blade type. Typical examples of Heatrae sizes and loadings are: Tubular heaters, 9in. projections, 1,000 W, and 50-in. projections, 6,000 W; blade heaters, 10-in. projections, 750 W (single blade), and 10-in. projections, 10,000 W (ten blades). The tubular immersion heaters produced by Messrs. Belling & Co., Ltd., range from 5¾-in., 250 W, to 24$\frac{7}{8}$-in., 3,000 W.

Benham blade-type immersers (12¼-in. projection, 200 W, are like those used in "Electro-Vapour" space heaters, and the withdrawable type (14½-in. projection, 1,000 W) has a

Various Designs of Household Clocks

The accompanying pictures are intended as an indication of the diversity of styles available—there are many others

THE advantages of a clock that is always right need hardly be stressed. The synchronous type can be relied upon at all times, for its accuracy depends on the speed of the tiny driving motor, which is absolutely proportional to and governed by the frequency of the a.c. mains to which it is connected.

Electric clocks are available in great variety of styles and materials. A novelty is the Electrical Commodities' (Hammond) calendar, which is described as a bichronous (non-stop) clock that indicates the day of the week and date of the month as well as the exact time. One of this company's alarm clocks has a dial made of translucent material with a tiny lamp behind it which illuminates the dial at night.

The Ferranti range is not self-starting. All are tested at ten times their normal working voltage. An additional centre seconds hand is fitted and the alarm models are of the buzzer pattern with a 24-hour setting so that they do not need to be reset the following day. The No. 7 alarm has a dial that is illuminated by a 3.5-V lamp, energised from the mains, which is automatically switched on at midnight and off at 8 a.m.

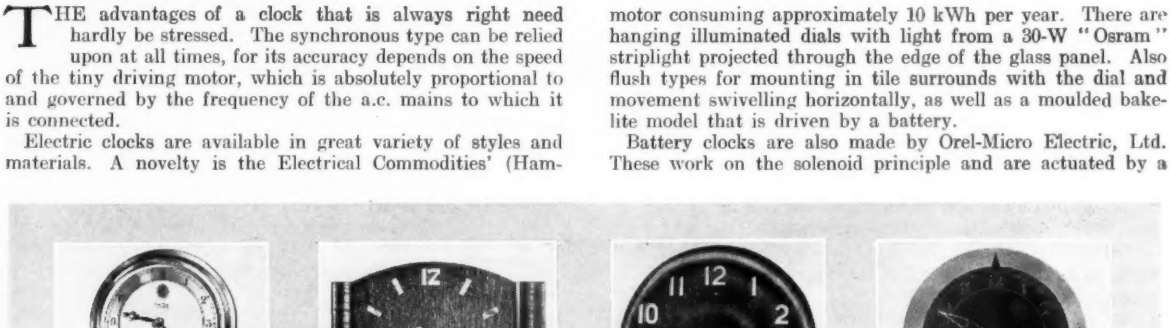
Smith's English Clocks, Ltd., offer a large selection, including battery driven types, one of the latest being the "Lark" synchronous alarm fitted with a self-starting movement. The G.E.C. "Genalex" movement is geared direct to a 200-r.p.m. motor consuming approximately 10 kWh per year. There are hanging illuminated dials with light from a 30-W "Osram" striplight projected through the edge of the glass panel. Also flush types for mounting in tile surrounds with the dial and movement swivelling horizontally, as well as a moulded bakelite model that is driven by a battery.

Battery clocks are also made by Orel-Micro Electric, Ltd. These work on the solenoid principle and are actuated by a flash lamp battery, the current consumption being claimed to be only 0.0005 A. The circular cases are available in a variety of phenol and urea-resin materials (moulded by De la Rue), the figures being raised and sprayed in contrasting colours.

Gent & Co.'s synchronous clocks are well known, other suppliers including the Lowne, British National and Sunshine.

In the T.M.C.-Harwell range are several recently introduced models; the "Temcolarm" has a self-starting motor, being obtainable with a luminous dial and hands. Synchronome clocks include a similarly luminous alarm as well as a plated table lamp combined with a clock.

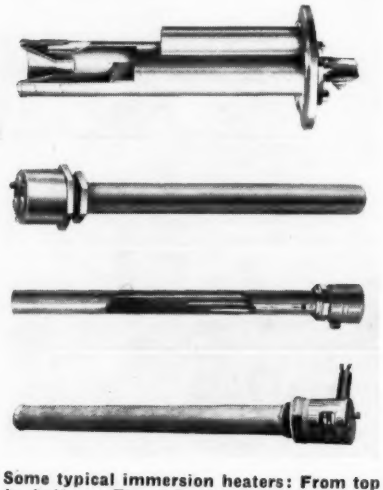
Striking and chiming clocks are generally available, the Westinghouse type's sounding mechanism being operated by an auxiliary slip spring that is wound automatically by the driving motor, the latter running at 180 r.p.m. and being of one watt only.



The makers of the clocks illustrated are: (1) & (2) Smith's English Clocks, Ltd.; (3) Orel Micro Electric, Ltd.; (4) G.E.C.; (5) Gent & Co.; (6) & (7) Ferranti, Ltd.; (8) T.M.C.-Harwell (Sales), Ltd.

Water Heating Methods and Apparatus *(Concluded from preceding page)*

refractory unit in a fixed sheath. Messrs. Reyrolle stress the facilities for earthing their units, which have former-threaded elements in welded copper casings (8-in. projection, 500 W).



Some typical immersion heaters: From top to bottom: The "Scallak" (Geo. Bray); Belling; "Highlow" circulator; Reyrolle

Commonly thermostats are separate, the Elexcel "Thermo-Immerser" unit simplifies fixing. A blade-type immerser, a drain cock and a thermostat are all contained on a three-way flange with a box cover. A template supplied for scribing the fixing holes and a holder for inserting the flange render fixing very easy. There is also an Eastwood unit with an immerser heater and an adjustable thermostat mounted on a two-way bolted flange. The "Gee-Gee" "Accident Proof" heater is an immersion heater which incorporates automatic switching apart from water-temperature control. Should the vessel become dry or the heater unduly furred a cut-out operates.

A good deal of domestic water-heating equipment for large premises is specially made, and most manufacturers will cater for this class of work. As an example of such equipment, but also because it points to an outstanding instance of the influence of large-scale water heating on supply load factor, we refer to the installation at Merton College, Oxford. There are about 90 undergraduates living in the college and the original bathroom accommodation was six baths and one shower bath, all run off a coke-fired boiler. During last year's Easter vacation three electrically served baths were added, of a type designed to use the minimum amount of water. Although the much bigger old baths are available, about one-third of the total baths are taken in the new ones. The whole installation is entirely automatic, a 250-gal. gravity-fed G.E.C. tank (lagged on site), loaded at 12 kW in two sections, allowing twenty baths to be taken successively before the water runs cold.

The total consumption for the summer term, one week of Easter vacation and the preliminary testing was 5,371 kWh, or between 4 and 5 kWh per bath, including all heat losses during the day and night. The total cost of electricity at three kWh a penny was about £7 10s., or under 5s. per undergraduate in residence per summer term. For a winter term (0.5d. per kWh) the corresponding figure is about 7s. 6d.

Appliances for the Home Laundry

Electric irons and wash-boilers are very popular, but there is much to be done in the sale of washers, ironers and airers

HOME laundry operations commence with the provision of hot water and include the boiling of garments. For these purposes there is a wide selection of wash-boilers, usually made of galvanised or enamelled sheet metal with a tinned copper inner pan. Short cast legs, a draw-off tap and a hinged or lift-off lid are provided. The average capacity is 10 gallons loaded at 3 kW, with three heats controlled in most cases by two foot-press switches.

The Bulpitt "Speedee" has an immersion-type loop element in a well-pan protected by a perforated cover plate. An automatic safety device is reset by a connecting rod that projects through the body. The 5-gal. "Wonder" is bucket shaped with carrying handles and loaded at 1,800/750 W, having a percolator for turbulating the water.

Left: The "Mayfair" gyrator washer. Right: The H.M.V. ironer

Santon boilers have a three-heat rotary switch. The cut-out is in a tube from which it is withdrawable. The heating elements are in six parallel tubes clamped to the bottom, and can easily be withdrawn. A 12-gal. combined clothes boiler and bath-water heater of the displacement type is supplied.

The elements of Veritys boiler are wound on mica, cased with copper and controlled by two s.p. foot switches that are recessed in the "Quality" 3.4-kW model and shrouded in the 3-kW "Competitive" series. Both types are obtainable with a hinged lid or patented table-top corner which, when reversed, forms a clothes tray with handles specially designed to hook on the side of the boiler.

The G.E.C. series is controlled by two foot-press switches, or, alternatively, a separate rotary switch with a bakelite cover on a wood block for mounting on the wall. The six 500-W copper-sheathed strip-type elements are clamped to the bottom, while a fusible plug type of cut-out can be added, together with a percolator.

The Falk, Stadelmann 10- and 7.5-gal. boilers are loaded at 3 and 2 kW and have "cramped-on" elements controlled by two 15-A kick switches. One of the Dugdale models has a lid so shaped as to act as a steam condenser and when inverted forms a wash basin. Three 850-W Bray "Chromalox" elements are controlled by a foot-press switch. This model is only 24 in. high and has an overall diameter of 17 in.

One of the "Burco" 10-gal. range is designed to boil clothes in addition to providing hot water for baths, operating on the displacement system. Another model (6-gal.) is designed for use in flats and small houses. It is portable and can easily be lifted off its tripod stand for storage. The Revo series includes tripod-base models with mica-insulated elements sheathed in copper and clamped to the bottom. A two-heat foot switch is fitted, while other 3-kW models have three kick switches or a rotary switch; the latter can be separately mounted on a wall.

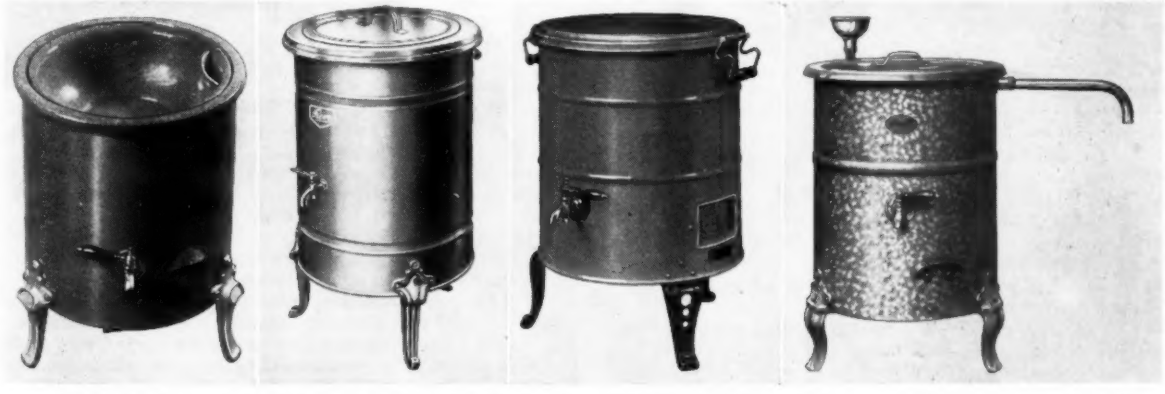
The Simister range includes a square model and a similar 3-kW "Washwell" to which a hand-operated agitator and wringer can be attached; also a round bath-water heater of the displacement type. The "Elexcel" is of modest dimensions, 15¼ in. in diameter and 25 in. high; a spray circulator and automatic cut-out are optional extras. The Jackson is square with a table top fitting over the inner circular lid; "Chromalox" elements are used and a "Perco-Wash" sprayer and automatic cut-out are extras. There are twenty "Uno" (Universal Boilers & Engineering Co.) models to choose from; fitted with mica-insulated metal - sheathed or Bray elements.

Simplex "Creda" boilers have a special cool handle fitted to the draw-off tap; two or three switches provide three- and four-heat control, the heating elements being of the mica-insulated clamped pattern. A copper percolating device is available. The Green models have a "Gee-Gee" immersion type heater, protected by a removable perforated cover. The Eastwood is bucket-shaped with tripod base.

Washing Machines

The more recently introduced household washers are of enhanced appearance, their design reflecting American influence. They have porcelain enamelled interiors and coloured exteriors, standing on four legs fitted with castors. More machines are being fitted with a pump; the average capacity is from 16 to 20 gal. or 6 to 8 lb. of dry clothes.

A single motor of about 0.25 h.p. drives through gearing both the gyrator and the overhanging swivel wringer, which has rubber rollers, a quick-release device and drip tray for returning water to the tub. The mechanism is usually enclosed, but the "Hotpoint-B.T.H." is one of the few whose motor and encased drive is visible below the tub. This machine has a rectangular exterior, a hinged lid and adjustable legs. It holds 14 gal. and will wash 50 lb. of clothes per hour. A roll ironer is interchangeable with the wringer.



From left to right: The Dugdale boiler with condenser lid inverted as a wash-basin; a Revo model; Verity boiler with recessed switches; a Burco dual-purpose boiler

The latest machine marketed by MacGregor and McCallum is the "Mayfair" gyrator model, which has a motor driven pump, in addition to the "Magic" vacuum cup type. Each of the three cups is individually spring loaded to compensate

for uneven height of clothes in the tub. All the motion is in one plane and continuously in one direction, to avoid straining the driving motor. The reversible wringer is interchangeable with a post ironer of 1,150 W controlled by a rotary switch, while there is a neat device for filling and draining the tub.

The Utilities "1900" washers include a de luxe model which is enclosed to within a few inches of the ground and has a pressure pump. The driving motor is rubber mounted. The wringer is interlocked to prevent its being moved when the power is on. The roll ironer is mounted on castor legs.

In the Hurley "Thor" range, also, one model has a full

The "Connor" (Ismay) and "Uno" washing machines

length skirt down to castor level. The pump is friction driven and a post ironer is interchangeable with the wringer. A single lever starts, reverses and stops the rolls, while the draining board is automatically reversing. The Universal Refrigerators' "Oxywash" machines are square, cylindrical or bucket-shaped. There is no agitator; instead a stream of air is forced through the water by a motor-driven blower. An immersion heater can be added as well as a hand wringer. The British National washer has a safety overload switch in the form of a motor starter which automatically trips if the machine becomes overloaded. The latest model has four legs instead of three, and an improved safety release for the wringer, which is interchangable with a roll ironer. A self-emptying power pump is another addition.

The four new H.M.V. models differ in style and each (except the cheapest) has a draining pump. The agitator and quick-release wringer may both be in operation at the same time. The new H.M.V. roll ironers are of the covered-table type, with an adjustable flap at one end. Three have 26-in. rolls and the fourth is 30 in. long. Two models have three heats, thermostatically regulated, with about 1.25 kW loading.

The English Electric washer has a square exterior, flat lid, and is driven by a single-phase split-phase motor. The detachable wringer has a safety release which is automatically resetting and a reversible drip tray. The Westinghouse "Spinner" is a double compartment machine on three legs the height of which is adjustable. The 12.5-gal. tub contains a turbulator. A pump is provided and the tub cover has a rubber silencer rim. The second compartment is a centrifugal dryer, containing a cone-shaped basket without perforations. The lid cannot be lifted while the spinner is in operation. A single 0.25-h.p. motor, rubber mounted, suffices for both operations. Single-tub models with a power wringer can also be supplied, while there are roll ironers the shoes of which have 1,300-W heating elements and both hand lever and knee control is fitted as well as an indicating heat switch.

The Ismay "Connor" washer is obtainable with a monel metal, nickel-plated, copper, or porcelain enamelled tub; a water pump is fitted and the wringer is interchangeable with a post ironer, a pilot lamp being attached. There is also the Searsint "Kenmore" washer, while the Sloan "Locomotive" incorporates a 500-W circulator-type heater in the tub, one switch controlling both heater and motor. The G.E.C. machine is loaded at 250 W and in place of the wringer a 1,000-W roll ironer can be used. A similar pedestal ironer is loaded at 1,250 W.

The "Norge" machine of Electrical Commodities is said to wash 6 lb. of clothes in six minutes and its interlocking wringer is prevented from swinging over under power. We are told that the "Bedal Astoria" is being made in Canada exclusively for British Electric Domestic Appliances, Ltd., whose gyrator model "M" is fitted with a streamlined wringer.

"Easy Washers" are available with spiralator, agitator, turbulator and vacuum cup actions. The single-tub models have a wringer with a self-reversing draining board, while the twin-tub type incorporates a centrifugal dehydrator, and all have electric water pumps. A roll ironer is obtainable to fit the wringer post, others being of the folding and swinging table-top patterns. The Hawkins "Supreme" is a square cabinet with rounded edges. A roll ironer may be substituted for the wringer. The "Washbury" machine is of about half the usual size and price. It weighs 28 lb., is 16 in. in diameter, 38 in. high and has castors so that it can be pushed under the kitchen table. The capacity is about 4.5 lb. of dry clothes.

The Falk, Stadelmann washer-wringers are of conventional design and include a lightweight tub without a wringer for use in confined space. The "Uno" washer-boiler made by Universal Boilers and Engineering Co. has a rectangular case down to castor level and a 3-kW element. The agitator has a lateral motion, swung from the top by a 0.25-h.p. B.T.H. motor, to which it is connected by steel bars through totally enclosed reducing gear. The wringer is hand operated.

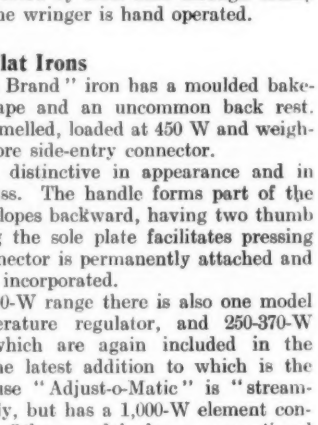
Flat Irons

The new Bulpitt "Swan Brand" iron has a moulded bakelite handle of unusual shape and an uncommon back rest. It is available plated or enamelled, loaded at 450 W and weighing 5 or 6 lb. with three-core side-entry connector.

The coloured H.M.V. is distinctive in appearance and in the more highly priced class. The handle forms part of the cover (not bolted on) and slopes backward, having two thumb rests. A fine groove along the sole plate facilitates pressing between buttons. The connector is permanently attached and a heat-controlling device is incorporated.

In the Premier 300 to 600-W range there is also one model with an automatic temperature regulator, and 250-370-W universal voltage irons, which are again included in the coloured Moseley range, the latest addition to which is the "Civic." The Westinghouse "Adjust-o-Matic" is "streamlined." It weighs 4 lb. only, but has a 1,000-W element controlled by a thermostat. Other models have conventional handles, some with ventilated rubber grips.

In the Revo series a "heat indicator" is available as an extra. The travelling iron weighs 3.5 lb. and is loaded at 250 W. Another model has a permanent connector with a metal cover protecting the terminals and forming the heel rest. In the Falk, Stadelmann range there is a 2-lb., 175-W travelling iron with an earthing connector, while the "Matchless" tray is asbestos padded and the flex is coiled round the carrying handle above the hot iron.



The "Kubby" airer (J. Glover & Sons)

The British National series includes a wrinkle-proof iron with a round heel; also the "Universal" 700-W adjustable temperature model for close automatic control between 350 deg. and 625 deg. F. The Sloan 450-W "Summit" is low priced, but guaranteed for five years and the travelling type has three plug pins for voltage adjustment. The standard "Sunco" has an element of the "Chromalox" pattern; another type has a permanent connector to avoid breakdown at the flex entry.

The Rowland's Electrical Accessories iron has a chamfered base and a large handle with a shaped groove for the thumb; it is supplied with an asbestos lined box. Plated and coloured "East London" irons are inexpensive, while the "English Electric" has an adjustable thumb rest and a retaining clip for the side-entry connector. The G.E.C. range includes 32 and 50 and 100-125-V irons as well as universal voltage models. Other makes are the Phillips, Brown Bros., Siemens, "Hotpoint," English Electric, Berkeley & Young, the Mitchell "Wizard," and "Simplex Creda."

The Premier connector contains a small indicating lamp and the Revo is combined with a push-switch. The number of irons now fitted with shrouded terminals and three-core earthing connectors is increasing. There are also the Dowsing and

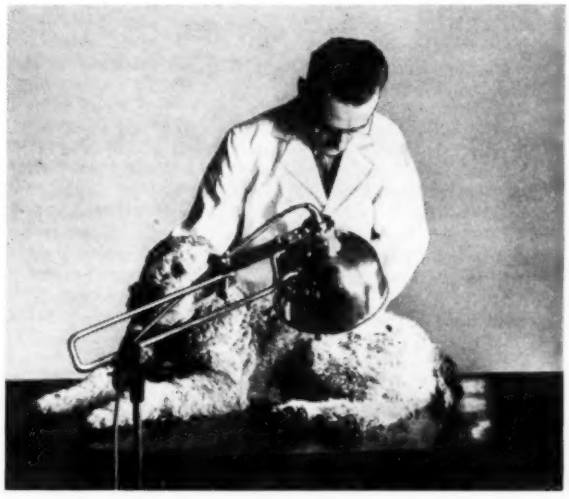
Health Appliances for Home Use

This article gives some details of a variety of devices for maintaining and restoring physical fitness

THE variety of appliances devised for home use as aids to the preservation of physical fitness may broadly be classified into light-ray producers, heat-ray radiators, electrical stimulators and electro-mechanical vibrators.

The B.T.H. 150-W "Mazda" and G.E.C. 400-W "Osram" ultra-violet-ray lamps contain a small filament that ensures the automatic striking of an arc between two tungsten electrodes, while the heat produced converts a globule of mercury into vapour which fills the glass bulb. The associated reflector is attached to a floor standard in the base of which is a special transformer, the equipment being for connection to a.c. circuits only.

The Thermal Syndicate's "Vi-Tan" outfit is compact and portable. A neat cabinet measuring 14 by 7 by 9 in. houses a quartz mercury-vapour burner, which produces the u.v. rays, together with an a.c. mains transformer. The connecting cable and plugs, and tinted goggles needed to protect the user's eyes during exposure, are stored in a cupboard through which access is obtained to the transformer tappings for adjustment within the limits of 200 and 250 V. This equipment demands 50 W only and can be used in any position, even inverted.



The "Bio-ray" heat radiator (Medical Supply Association) can be used for domestic pets as well as humans

Similarly, the Hanovia "Homesun" model will operate at any angle, being self-starting. The transformer is contained in the base of the table standard and the u.v. rays are produced by electronic discharge within a high-pressure mercury-vapour tube made of quartz, which is mounted in an adjustable reflector.

The Medical Supply Association's "Medisun" lamp has been redesigned and now also employs a quartz electronic discharge tube. The advantages of these newer types over the old evacuated pattern are that no tilting or other mechanical starting device is needed; they are more stable in operation and less sensitive to temperature fluctuation. They are less fragile because the quantity of mercury enclosed is so small, less electricity is consumed and the ray output is slightly greater.

Apart from the specific action of infra-red heat rays, radiant heat is a valuable thermo-physical palliator and in certain cases an invaluable preparatory to the more physiological ultra-violet irradiation. Consequently, dual-purpose appliances are available, such as the Arora tungsten-cored carbon arc lamp below which is mounted a radiator element in a parabolic reflector with a separate switch to enable it to be used as an ordinary fire.

The Read "Duo-ray" and the M.S.A. "Bio-ray" apparatus consists of a hand reflector, which can also be clamped in an adjustable floor standard, arranged to throw a parallel beam and to accommodate either a filament bulb of 100 W for luminous heat or a 200-W heater element for infra-red ray emanation. Double-purpose lamps are likewise offered by the Sun Co., differing in the shape of reflector used and in size, the filament bulbs being of 200, 300 or 500 W and the infra-red element (protected by a wire cage) of 280, 450 or 600 W.

There are also Modinstal infra-red radiators. The Calvete dry-heat lamp is luminous, as is the Sloan Electric outfit with a 200-W bulb in a parabolic reflector arranged for clamp-

Appliances for the Home Laundry *(Concluded from preceding page)*

"Modinstal" cordless types, used in conjunction with reheating stands in which are incorporated automatic switching arrangements.

The Dowsing glove and stocking formers are electrically heated for simultaneously drying and stretching, while the "Modinstal" egg-shaped pedestal iron is designed for penetration in parts which are otherwise inaccessible; the switch and connector are housed in the enamelled base plate.

There is a Dowsing box-like heater for goffering irons (similar to curling tongs) loaded at 700 W and heat-insulated table stands for ordinary flat irons are also supplied. Among the novelties are the Driver "Empire" and Reid V-bladed heaters for creasing trousers by hand.

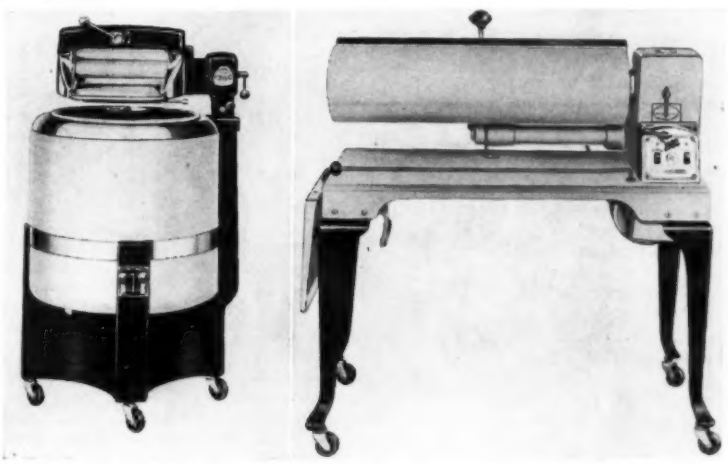
Airing Cabinets

It is convenient to be able to dry garments indoors, and to air linen generally, by hanging them in sheet-steel cabinets containing heating elements at the bottom. The H.M.V. model is quite new, and finished in black and white. It has a three-heat switch and a 3-kW loading. Its dimensions are 6 by 3 by 1.5 ft

Another new product is the drying cabinet of Archibald Low, also loaded to 3 kW. It has a full length single door, mounted centrally above which is a three-heat switch. The horizontal racks slope forward and there are ventilating holes at the top and bottom on both sides. The heating elements at the bottom are protected by insulating material and a wire guard. The finish is green enamel. The Brice and the Caird, Chandler cabinets have half-length double doors and top vent holes at the front and sides. The racks are flat or inclined according to size; loadings are from 1 to 6 kW with single or double switches.

The Sun Co.'s "Eco-Dry" models stand on four legs, have a single full-length door and arm-type racks. They are all of the same height, but vary in width and depth, having a three-heat control and loadings of from 2.25 to 8 kW. The interior of the cabinet is lined with asbestos and the exterior is enamelled.

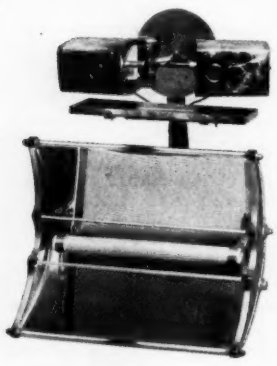
The Glover "Kubby" is similarly lined inside, but is of the wall cupboard type primarily designed as a towel airer. It has double doors with vent holes at the top, and swing-out rail rack. The 400-W element provides a maximum temperature of 125 deg. F. The "Newmectric" has a temperature indicator and full length doors.



The "1900" streamline washing and ironing machine (Utilities, Ltd.)

ing to a tripod or telescopic stand on castors. The "Uvral" models sold by Sun and Sloan have two plug-in heat resistors combined with two or more carbon arcs producing u.v. rays, the whole being automatically controlled by mechanism enclosed in the rear of the large bowl reflector on an adjustable table stand.

The Schall folding light bath, hinged so as to enclose a limb joint, has an anodised aluminium back and bakelite sides (moulded by De la Rue). Three filament lamps are fitted in each side, another model being obtainable with a separate reflector behind each lamp and a wire guard in front of them covered with heat-resisting material. Read, M.S.A. and Sun light baths operate on the same principle, while the "Sun Universo" is fitted with long-wave infra-red elements and is specially adapted for the treatment of joints and extremities.



Arora u.v. lamp and fire

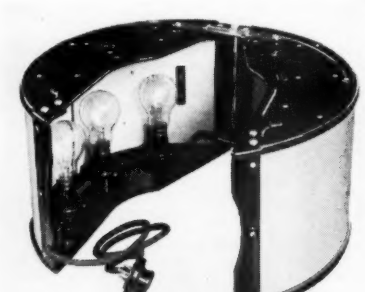
Electrical stimulators (commonly known as violet-ray outfits, but not to be confused with ultra-violet ray lamps) consist of a non-rotary generator of high frequency for universal voltage mains use.

The output is regulated by merely turning a knob and the applicator electrodes are evacuated glass tubes (which glow violet when the discharge takes place) of numerous shapes and forms, the whole contained in a neat carrying case, such as the Calvete "Everay," Read "Ideal," and the London Commercial Electrical Stores' outfits. Both the frequency and current outputs of the larger "Sunco" sets can be adjusted, and an automatic cut-out prevents overloading. One of the Sloan "Uvral" sets is suitable for operating off a 6-V accumulator.

Then there are small vibro-massage machines, also supplied in a convenient carrying case, consisting of a high-speed motor with a protruding shaft to the vibratory tip of which various padded and rubber-capped applicators can be fitted. The Calvete machine has a speed regulator and switch, while the Read "Sanax" and the larger "Penetrator" are fitted with three-power regulators. The "Commercial" vibrator is driven by a ball bearing motor having a bakelite body and weighing 4.5 lb. complete.

The Cooper-Stewart model is unusually small and neatly contrived; it is made for a.c. only and is really silent in operation. The intensity of vibration of the G.E.C. machine is reduced by pushing the applicator spindle in and turning it sideways, while another model has a two-speed switch in the handle and a universal motor rated at 40 W. The Sloan is a single-speed outfit, while the strength of vibration of the larger Sun machine can be regulated by adjustment of the nose-piece.

A larger type of stimulator is arranged for pedestal, table or wall mounting. It consists of a motor with an eccentric drive, the vibratory movement being transmitted through a canvas belt loosely wrapped round the user's affected limb.



Schall folding light bath

The G.E.C. motor is of 200 W and has double-service ball bearings to absorb both radial load and end thrust. There are three adjustments of stroke and a shock-proof switch. The M.S.A. "Metro" vibrator motor is mounted on a pedestal in a stirrup fitting, enabling it to be set at any desired angle and locked by two wing nuts. The "Provita Masseur" offered by Read & Sons is intended for trunk application, and is driven by a vertical pedestal motor with an adjustable oscillatory stroke.

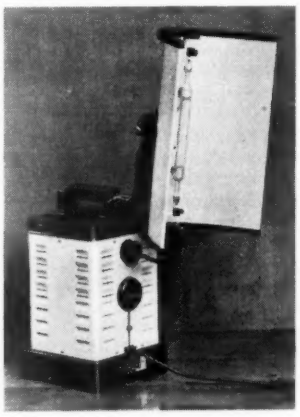
Electric blankets not only produce comforting warmth, but also drive dampness out of beds. Among them is the "Thermega" which is controlled by two temperature regulators, which automatically switch the heating elements on and off as required to maintain constant warmth. These regulators are in duplicate, only one being necessary for control, the other being an additional safeguard. They are obtainable for any voltage between 25-250 V a.c. and d.c.

Smaller universal voltage pads are available for indoor and open-air use, or as foot warmers. They are thermostatically controlled, and three heats of about 100 deg., 130 deg., and 160 deg. F. are obtainable by means of a pre-setting switch in the flexible connector. There is also a floor mat for use under a desk or table, as well as a motor car mat for operation at 6 or 12 V, producing a temperature of 100 deg. F.

A feature of the latest "Milliwatt" domestic blanket is its so-called "self-sufficient" element. The flannelette cover is not depended upon to keep the heating cord in position. It is provided with an unusually thick asbestos covering and is arranged in such a way as to avoid any leads crossing, thus preventing the possibility of short circuiting. As many as six thermostats are fitted to minimise risk of overheating.

Other names under which electrically heated pads are sold include M.S.A., Falk, Stadelmann, British National, and Auto-Maid. The Westinghouse "Adjust-o-Matic" has a three-heat switch and a loading of 60 W.

Among bed warmers are thermal-storage types for disconnection from the heating circuit before insertion in the bed. The G.E.C. three-sided "bottle" is made of earthenware, packed with heat retaining material, in the centre of which is a 500-W element. The Cooper-Stewart is made of metal, flat disc shaped, with a 400-W element. The Crittall "Dulrae" bed warmer is of the flat "tray" form for hanging beneath the bed and it is thermostatically controlled.



Hanovia "Homesun" lamp

Bronchitis kettles are available with long spouts through which a steady volume of steam is emitted. Earthing connectors are provided, together with a large lid to allow the interior to be easily cleaned. The 6-pint Bulpitt model has a two-heat element of 500/1,800-W, and is protected by a capsule safety device as a precaution against boiling dry. The 4-pint "Premier" is of 650 W and has a safety device also. The filler cap is designed to allow water to be added without stopping the operation of the kettle and it acts as a water level indicator as well.

For air purification, deodorising and disinfection there are "Ozonair" appliances of different kinds, including domestic models small enough to be combined with a table lamp or fan and loaded at a few watts only.

Electrical Housecraft

THE second Summer School of Electrical Housecraft for Teachers organised by the E.A.W., held this year at King's College of Household and Social Science, was attended by 107 teachers of domestic science from all parts of the country. The five-day course was officially opened on Friday, September 25th, by Councillor Mrs. Gregory, chairman of the E.A.W., and the opening address was given by Sir John Brooke, vice-chairman of the Electricity Commissioners.

Mr. R. Y. Sanders (Central Electricity Board) then gave a lucid description of the modern methods of generation and distribution of electricity, illustrated by lantern slides.

During the rest of the day addresses were given by Miss T. J. Dillon, M.Sc., physics lecturer to the College, followed by practical work on the study of simple electric circuits, and by Miss Dorothy Vaughan, on electric laundry equipment in the domestice science centre. On Friday evening a reception was given at the Brompton and Kensington Electric Supply Co.'s showrooms.

On the Saturday morning Mr. V. H. Vale spoke on electric cooker design and there was a lecture demonstration on cooking by Miss J. Lindsay.

The afternoon was devoted to more practical work in the laboratories under the tuition of Miss Dillon, and to a lecture on the construction and use of small appliances by Miss Vaughan, illustrated by some of the newest models.

On the Monday, Mr. A. E. McKenzie, borough electrical engineer of Wimbledon, gave an address on tariffs and in the afternoon the teachers visited the E.L.M.A. Lighting Service Bureau. On Tuesday there were lectures by Miss Lindsay and Miss Dillon.

The course concluded with a visit to the G.E.C. Research Laboratories, Wembley.

The Advance in Refrigeration

The past year has seen great activity in the installation of refrigerators, but much remains to be done

THE year has been conspicuous by its lack of summer weather, and should therefore have been a very poor season for refrigeration. Yet, reviewing the progress that has been made by both municipalities and manufacturers, we can only wonder what surprising increases in sales would have taken place if the weather of 1934 and 1935 had been repeated. Two facts in particular stand out—there are at least twelve newcomers to the refrigerator market, while the figures given to us by a number of undertakings show that the number sold on the hire-purchase system rose substantially.

Where refrigerators are being sold by a municipal undertaking a five-year hire-purchase scheme is usually available. Three and 4 cu. ft. models are generally the most popular (the former being sold at about 2s. 6d. per week), but both Mr. C. Nelson Hefford, the general manager at Leeds, and Mr. W. N. C. Clinch, of Brighton, complain that space for the larger model is non-existent in the kitchens of modern small houses. This was a grievance that was shared also by Mr. F. V. Wallington, of the Lightfoot Company.

One of the most successful undertakings is the North Metropolitan Electric Supply Co., Ltd., in whose area the refrigerators of four well-known makes were standardised for sale, the 3 cu. ft. model forming the basis of a special offer comprising free installation, free service and maintenance for a period of five years, payments of 2s. 6d. per week being spread over five years, with no deposit. During the eight months up to August 31st this year 1,250 refrigerators were sold, 63 per cent. of 3 cu. ft. capacity, in connection with the special offer. These figures are three times those for 1935. Considerable attention was paid to canvassing and advertising.

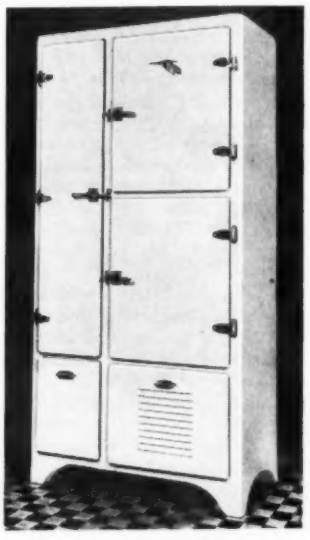
Very favourable results were obtained at Wimbledon. During a conversation with Mr. Larney, the commercial assistant, we learnt that the number of refrigerators hire-purchased during the first eight months of 1935 and 1936 were 105 and 302 respectively. We were informed that of the latter 56 were sold during February and March and 190 during April, May and June. Two-thirds of the total were 3 cu. ft. models (2s. 6d. per week), the purchaser having the choice of three makes. We were particularly interested in a sample of the corporation's advertising leaflets giving a comparison between gas and electric refrigeration. Both allow a purchase period of five years, and the total outlay is £31 15s. for gas and £32 10s. for electric, yet the gas model has a capacity of only 2 cu. ft. as compared with the electric's 3 cu. ft., while their respective running costs work out at £2 5s. 9d. and £1 0s. 3d. per year. It is found that any consumer with a house with a rateable value of over £30 can be considered a potential consumer, although in the North-east Coast area machines were sold chiefly to a class of consumer occupying houses with a rateable value of from £60 to £80 and these were mainly models of 5 or 6 cu. ft. Mr. W. F. T. Pinkney, lighting and heating engineer of the North-Eastern Electric Supply Co., Ltd., found that most of these purchasers preferred to buy their refrigerators over a period of two years rather than five years.

Mr. J. N. Waite, of Hull, reports a favourable reception of the sales campaign started in April. Two-thirds of the total were 3½ cu. ft. models sold at 2s. 6d. per week, the same size as was found most popular at Croydon, where, Mr. F. N. Rendell-Baker informs us, the number sold increased from 57 during 1935 to 175 during eight months of 1936, a similar proportional increase to that secured by County of London Co. and London Associated Electricity Undertakings, Ltd.

The "Sternette" D.M.4 and H.M.V. B.1

The competition of gas is being combated actively, though at Birmingham, where the five-year scheme for electric models has only just been introduced, Mr. F. Forrest considers that inasmuch as its publicity has helped to make the public "refrigerator minded" the gas industry has aided the electrical industry.

When it is appreciated that no fewer than 49,000 out of a total of 55,000 houses in the district are rated at less than £18 per annum the progress at West Ham is quite good, the special rate of 2s. 3d. per week for a 3 cu. ft. model proving an inducement. Ealing, too, shows an increase of over 100 per cent., mainly in the 3½ cu. ft. size. Mr. R. Birt estimates that 1,000 refrigerators are now connected to the mains, 208 applications for supplies having been received this year. He finds that they are seldom used in houses rated at less than £26 per year, although in the County of London Company's area, where only half of those sold are as small as 3 cu. ft., every type of house has been supplied.

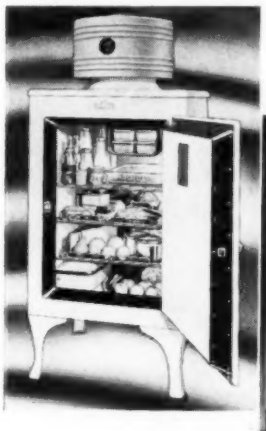


The "Express" model B. refrigerator and larder

Generally speaking, figures from the provinces do not show such big increases, partly due to the later inauguration of the five-year scheme, though progress has been made at Bristol, Maidstone, Gravesend and Cardiff. Hammersmith (Mr. A. F. Harmer) has also only just commenced the h.-p. scheme, although in the large blocks of flats they are being installed by the builders as standard equipment. Very few models under 3 cu. ft. are bought now, although East Ham Corporation (Mr. W. R. Elliott) is selling them at 2s. 3d. per week, while an increase is also reported from Ilford. Up to July 31st the London and Home Counties J.E.A. had disposed of 201.

One of the facts that strike us from the figures in our possession is that despite the unfavourable weather only one undertaking reports a decrease, while at Wimbledon the campaign (in view of the high kitchen temperatures) is being continued through the winter, a move which is strongly backed up by some of the manufacturers.

In all, twenty-four makes of refrigerators are available, about half of these being made or assembled in this country. All these are of the compressor type, except two—the Ismay "Zeros" and "Frigedom" combined kitchen cabinet and refrigerator, both of which work on the absorption



The B.T.H. G.L.68 and the small "Kelvinator"

principle (the application of heat to a liquid refrigerant). The main advantages of the latter system are the absence of any moving parts and the fact that time-switch operation enables it to be set to work during off-peak hours only when special tariffs are available; against this must be set the increased consumption of electricity.

The "Zeros" is available in four sizes from 2¼ cu. ft., the small model being available on h.-p. terms of 2s. 3d. per week. The unit works on an eight-hour cycle comprising 1½ hours heating and 6½ hours reabsorption to produce cold. The refrigerant is liquefied in the condenser and it then flows down into the receiver. After the heating period is terminated the temperature of the absorber-generator drops and the warm absorber is able to reabsorb the refrigerant. This then evaporates and produces cold. This is concentrated in the storage box, which becomes a solid ice block.

The 5TA "Coldair" table-top model

Of the other refrigerators, which are of the motor-driven compressor type, two—the B.T.H. (International Refrigerator Co., Ltd.) and the "Westinghouse" (sold in this country by the Lightfoot Refrigeration Co., Ltd.)—employ hermetically sealed units, but whereas the B.T.H. has a naturally air-cooled "hat" on top the "Westinghouse" unit is enclosed beneath the cabinet and cooled by a forced draught created by a fan driven independently by a 1/200-h.p. motor. There has been an improvement in the appearance of the B.T.H. models, the new "G.L." series having a unit with a smooth exterior finished in white lacquer. Models are available from the G.L. 48 (4.8 cu. ft.) to the G.L. 94 (9.4 cu. ft.), while still larger models are made in the "R.M." series. A newcomer is the F.T. 30 (3.4 cu. ft.) which contravenes the usual B.T.H. practice by having the compressor situated beneath the cabinet, but still incorporates the easily replaceable circular sealed unit.

The full range of "Westinghouse" refrigerators includes models from 3.2 cu. ft. to 9.5 cu. ft. Apart from the sealed unit the special feature of these machines is the automatic overload cut-out, which takes the form of a bi-metal disc. An overload causes the disc to heat up and spring outwards, thereby breaking the circuit. It resets itself automatically on cooling. Seven freezing speeds are provided.

"Dulux" finish is used by both the Westinghouse Co. and the Stewart Warner Corporation (English agents: Cooper-Stewart Engineering Co., Ltd.) for the "Sav-a-Step" models, available in seven sizes from 4.5 cu. ft. to 8.1 cu. ft. The name "Sav-a-Step" has been given because of a special removable metal basket. This normally fits in the refrigerator, but is fitted with hinges enabling it to be swung out; it can then be lifted from its hinges and clipped to the inside of the door, or it may be removed completely and placed upon a table. Another special feature is the "Slid-a-Tray," directly below the food compartment. The company has published some interesting figures which show the reliability of the present-day electric motor. Last year the number of refrigerator motors returned to the factory for repair was 0.03 of one per cent., the corresponding figures for the compressors and float valves being 0.62 and 0.67 respectively The average daily consumption was found to be 0.4 kWh, the running time being 12 mins. per hour.

An "Aerofrige" model and the "Westinghouse" E.D.70

Rounded edges and a black-and-white finish with chromium for the hardware give the H.M.V. refrigerators a singularly attractive appearance. The range extends from the 3.25 cu. ft. size, which is being sold extensively by dealers on extended h.-p. terms, to the 11.17 cu. ft. model. Special features are a "tip-down" basket for fruit and vegetables and the fact that coloured finishes can be obtained. The "Silent Circulator" compressor unit has only three moving parts and runs in an oil bath. In addition to a range of ten standard models, Kelvinator, Ltd., has two small low-priced types with a front opening door and capacities of 2¼ cu. ft. and 3 cu. ft. The unusual 2 and 3 cu. ft. "Kelvinettes" with their lid type opening are among the cheapest on the market and are specially useful where space is restricted.

Variety in shape is a feature of the Coldair refrigerators. The 3.1 cu. ft. model is made in standard and de luxe forms, while a 5¼ cu. ft. size has a compressor above which is a drawer, side by side with the cabinet, providing a flat "table-top" of 47¾ in. by 21½ in. There is, however, a standard type as well. The "Master" series of three models and four "Super" models are being maintained by Frigidaire this year with very little change, making in all seven sizes available from 3.1 cu. ft. to 15.1 cu. ft. The sliding shelves on the "Master 6" are an improvement worthy of greater attention.

Despite the poor summer the Sparton Refrigeration Co. reports a good season, a special appeal having been made by the model "S.226" (2¼ cu. ft.), which is being sold on h.-p. terms at 2s. 3d. per week. There are seven additional models, the three largest ones embodying clocks which serve to defrost the cabinets every 24 hours and a vegetable bin with a drop-down door below a drop-down tray fitted in the door itself as well as the basket shelves which are supplied with all "Shelvador" models, even the baby "T.20" (2 cu. ft.).

The new "Zeros" 2.R.2. and the "Moffat" M.32

Orthodox appearance characterises the Marco refrigerators, of which four sizes are available—2, 3, 5 and 8 cu. ft. In all except the latter the trays in which the ice cubes are produced are situated in the top left-hand corner of the cabinet, a position utilised also in the "Prestcold" refrigerators (Pressed Steel Co., Ltd.). The motor and compressor are situated just above, the space below the cabinet being utilised for a pull-out vegetable bin. A new slow-running motor has been fitted to the Moffat models, one example of which, the M.32, is illustrated.

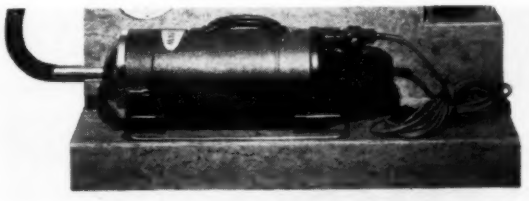
Among newcomers are the "Coldspot" models (Searsint. Ltd.), of which five models are available up to 8 cu. ft., the "Sternette" and the "Express." The most interesting point in the specification of the four "Sternette" models (L. Sterne & Co., Ltd.) is the fact that all are fitted with universal motors. The sizes are 3.3, 4.3, 6.3 and 8.3 cu. ft. Refrigerators for building into recesses and combined with other equipment are a speciality of the Express Refrigerating Co., Ltd. Model "A" has been designed to be adapted to an existing larder without occupying any additional space. Type "B" incorporates, in addition to a 3½ cu. ft. refrigerator, a cupboard at the side 4 ft. 6 in. high, a cool larder above the refrigerator cabinet and a vegetable and bottle bin below.

Vacuum Cleaners and Floor Polishers

The number of machines on the market continues to increase and many of them possess special features

CHANGES in vacuum-cleaner design during the past year have been few and far between, apart from minor improvements. The three broad distinctions—canister, external bag and cylinder types—remain and prices range from £3 to £20. There are only three canister models available, the "Welbeck," "Norfolk" and "Tellus." The former is unique inasmuch as it is of square construction. The efficiency of this type is due to the fact that the filter never becomes clogged with dust; the bag acts only as a filter and does not actually collect the dust which is deposited in the canister, deposition being facilitated in the case of the Welbeck by the square canister. The cleaner, which is made by the B.T.H. Co. has an easily removable motor and can therefore be used for spraying. The usual accessories are provided and are normally held in a rack around the side of the canister; a recent improvement is a rotary brush fitted inside the nozzle driven by the pressure of two rubber-tyred wheels in contact with the floor. It is brought into action by pressing on the nozzle.

The "Tellus" (225 W) and "Norfolk" (200 W) are both circular in shape, but in every case the motor is situated at the top and draws air out of the canister through a suspended bag, a swirling action preventing the dust from clinging to the bag.



The "Mary Ann" vacuum cleaner

There is a wide variation in the prices of the external bag type cleaners, but generally speaking they cannot be obtained so cheaply as the mass-produced cylinder type, the latter having the widest price variation of all. The great advantage of the external bag type is that, being mounted on wheels and not needing assembling, it can be stood in the corner of a room and used at a moment's notice, although in favour of the cylinder type is the flexible tubing which enables the machine to be used for cleaning curtains, furniture, etc.

Some kind of revolving brush is generally to be found incorporated in the external bag type, and these necessarily have large area nozzles which are easily kept in the correct position in relation to the carpet. Among this type are the "Hotpoint," "Hoover," "Vactric," "Kenmore" (Searsint), "G.E.C.," British National Electrics "Universal," and the "Silobeta," while stationary brushes are fitted to the "Ediswan" and "Westinghouse." The "Hotpoint Junior" has now three-core rubber-insulated flexible cable together with a special insulated switch.

The "Ediswan" cleaner

Suction alone is employed by the "Eureka," "Eddo" (Moseley), "Apex" (Rotapex, Ltd.), "Duchess" (R. G. Dixon), "Silovac" (C.C.A. Vacuum Cleaners), and "Gilbert." Two unusual machines, the "Bustler" and the "Goblin Wizard" (British Vacuum Cleaner & Engineering Co.), are also of the bag type, but have the motor "in line" with the handle, the top part of the handle being removable to convert them into hand machines. The "Wizard," however, is fitted with wheels so that when used on carpets no weight is taken by the handle. The "Goblin Ideal," also employs "in-line" construction, but in this case the machine is of the cylindrical type with fixed extensions at either end. Fabric bags which have to be cleaned are the usual equipment with most machines, but the "Siroma," "Goblin Ace" and "Dizer" employ special bags which are thrown away after use; a feature of the last is a glass window which enables the user to watch the dust flow while the machine is in action.

By far the greatest number of vacuum cleaners are of the cylindrical type. Among some of the more expensive models

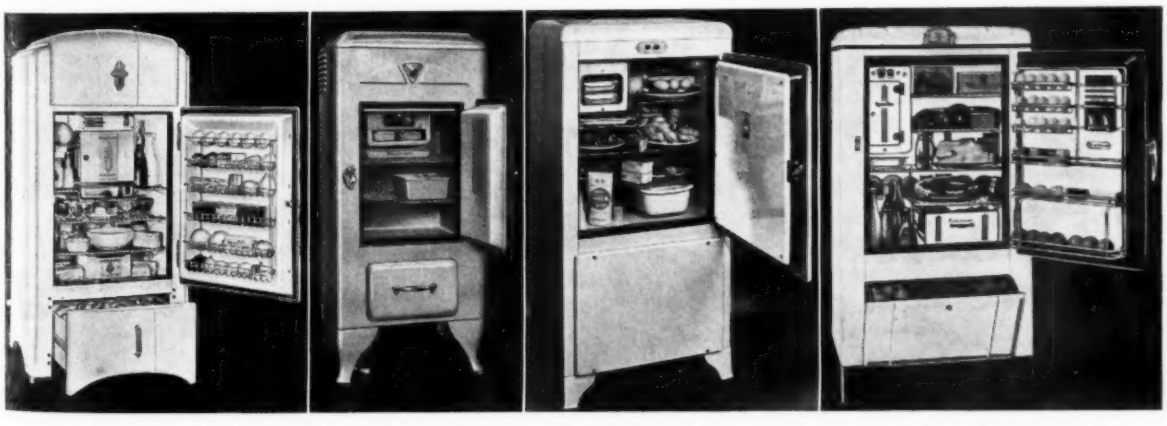
The Advance in Refrigeration *(Concluded from preceding page)*

Three "Star" standard domestic models are included in the range with capacities of 2½ cu. ft., 3½ cu. ft. and 5 cu. ft. The 3½-cu. ft. refrigerator is made also with a cooker and combined with a "Staybrite" sink, the refrigerator cabinet in each case being situated at the side and the cooker (or sink) over the compressor.

Another newcomer is the "Servel" (Utilities (London), Ltd.), which is made in four sizes from 3 to 6 cu. ft. The compressor in this case is mounted above the storage cabinet, which contains, in addition to the usual trays and shelves, a sliding fruit basket and a double-depth dessert tray. A quick-release trigger is fitted to the ice tray. Two "Aerofrige" models (British Electric Domestic Appliances, Ltd.) are being made. Both are built on orthodox lines with the compressor mounted above the cabinet. Basket shelves are fixed to the door to provide extra storage accommodation. The idea is one that is utilised in many models, notably the "Shelvador," "Moffat" and "Sparton."

A Delco-Remy and Hyatt motor driving a compressor running at 420 r.p.m. is employed by Savoy Refrigerators, Ltd. Three and 4 cu. ft. sizes are made both in the upright styles and "side-by-side," with a flat top. In each case the corners are rounded off. The table-top models have a withdrawable storage drawer above the compressor. Complete ranges of "Beach" (MacGregor & McCullam, Ltd.) and Zerozone refrigerators are available, while Leda Electric, Ltd., also make domestic models.

Taking a broad view of the situation, the year can be said to have been remarkably successful, but the scope remaining is enormous.

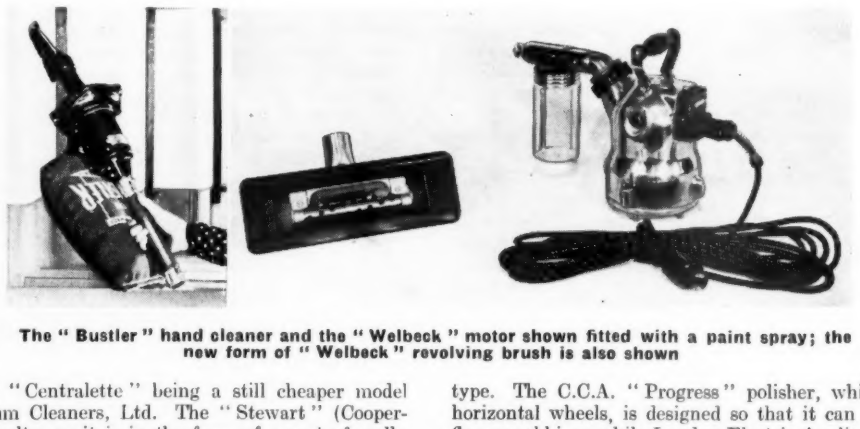


Four domestic refrigerators: the "Shelvador" DL.60, "Prestcold" DL.35, a Marco refrigerator and a Sparton model

are the "Goblin Triumph" and "Ace," "King Dick" (Abingdon Works), the "Electrix Super" (Ismay), the "Efesca Major" (Falk, Stadelmann), the "Bedalax" (British Electric Domestic Appliances), and the Vactric "Silent Q." There are many low-priced machines of this type. Among them is the "Tireless Tim" (Hogan & Wardrop) which is about to be produced also in a "de-luxe" form, and "Mary Ann" (British Domestic Electric Appliances).

A machine known as the "Elray" is being sold by the East London Rubber Co., Ltd., and the well-known "Summit" cleaner of the Sloan Electrical Co. is being retained. The "Efesca Minor" is a small version of the "Major," while the same applies regarding the "Silovim," and the smaller "Silobabs," the "Centralette" being a still cheaper model by C.C.A. Vacuum Cleaners, Ltd. The "Stewart" (Cooper-Stewart) is a novelty, as it is in the form of a sort of walking stick, the entire cleaner with fittings weighing only 7 lb. A special hinged nozzle and a roller brush can be obtained. Quiet operation and a swivel nozzle are features of the Vactric "Popular," while a throw-away paper bag is used in the "Goblin Clean-Sweep."

An all-bakelite case is a safety measure employed in the "Stewart Dustmaster," the "Auto-Maid," the "Silobabs," and certain "Bylock" models. The "Dustmaster" is mounted on three wheels instead of the runners which are usually fitted.



The "Bustler" hand cleaner and the "Welbeck" motor shown fitted with a paint spray; the new form of "Welbeck" revolving brush is also shown

Several hand machines are made, in addition to the combined models referred to above. There are, for instance, the "Hoover," the British National "Universal," the "Vactric" which has an aluminium body, the "Gilbert," the "Ferret" (L. G. Hawkins) and the "Kenmore."

The number of floor polishers, too, is increasing. The G.E.C. employs two horizontally revolving brushes, as do also the "Electrona," "Vactric" and the "Xcel" (Elexcel, Ltd.). The last is also available in the same form but with the addition of a suction fan and dust-collecting bag. One brush is used in the "Junior Poliflor" (C.C.A.) and the "Supreme" (L. G. Hawkins), the "Duco" and "New Poliflor" employing a dual-revolving brush of the cylindrical type. The C.C.A. "Progress" polisher, which employs two horizontal wheels, is designed so that it can also be used for floor scrubbing, while London Electric Appliances, Ltd., make the "Simon" electric floor scrubbing machine in a number of sizes.

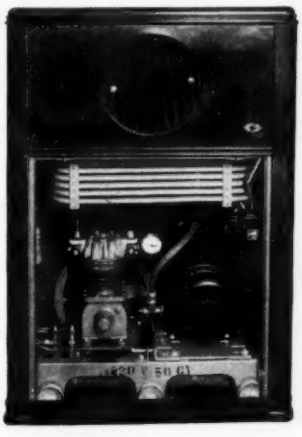
There are, in addition, many small machines priced at under £5. Frequently the same machine is made by one manufacturer for several concerns. Bylock, Ltd., for instance, claim to make machines which are sold under a hundred different proprietory names. How far we have to go before saturation point is reached it is difficult to estimate, but apart from lamps and irons, it is about the first electrical appliance the housewife thinks of buying.

1. The G.E.C. cleaner. 2. The "Junior Poliflor." 3. An unusual Cooper-Stewart "walking stick" cleaner. 4. The "Vactric Airflow" model. 5. The "Goblin Ace." 6. The "Simon" scrubber. 7. The Sloan "Summit" model

Miscellaneous Appliances

Devices for air conditioning, for food preparation, dish washing, toilet, garage service, water supply, etc.

INCREASING attention is being paid to air conditioning and ventilation, as distinct from the occasional use of simple fans. For instance, the "Ilg" cooler, which has been introduced into this country by Air Conditioning & Engineering, Ltd., is a self-contained small cabinet that operates on the refrigerator principle. The room air is cooled by being drawn by a fan through a coil containing liquid "Freon." The associated compressor and its driving motor are both water-cooled, about 0.75 gal. per minute being needed, and the electrical loading is 600 W. The outfit is controlled automatically by solenoids, switches and valves. "Ilg" fans include a floor pedestal model and a kitchen exhaust ventilator that can be built into the wall or attached above a door or to a window panel.



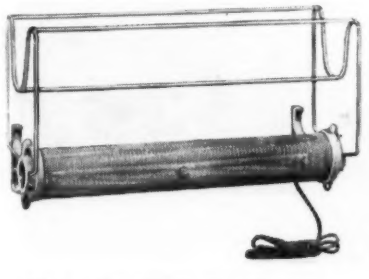
The "Ilg Spot Cooler" for air conditioning

The Ashton bowl pendant raises water from a small reservoir and, by centrifugal force, forms a cascade spray through which air is continuously forced by a fan; a deodoriser can be switched on at intervals.

The "Conditionair" apparatus is divided into four parts within a cylindrical casing. Air is drawn through a pipe inlet at the top into a cooling chamber; it then passes down into a fan and sprayer compartment, wherein the air is washed and humidified; the third compartment is a disperser, whence the air passes through a heater at the bottom, which expels it outward through gratings. A 200-cu. ft. p. m. model for a room of 2,500 cu. ft. is 30 in. high and 15 in. wide.

"Icail" (I. Calvete, Ltd.) curling tongs

The Crittall transportable air conditioner is a rectangular cabinet on castors. Air enters through a filter at the back and is ejected through a diffuser at the top, the interior apparatus including a motor and fan, ozoniser, three heaters, cooler and humidifier with water tank. It will deal with a room of 4,000 cu. ft. capacity, the loading being about 2 kW.



Bulpitt rail heater for bathroom or cupboards

The "Sterilizair" pendant or floor standard consists of a small vertical motor driving a horizontal fan which draws air upwards through a filter cloth kept damp by a water trough below.

The Sunshine "Electro-aire" freshens stale air; the small louvred aluminium cabinet is of 20 W, while the wooden cabinet is of 40 W and equipped with a vertical fan.

Berkeley & Young table fans are rated at 30 W, and a three-speed regulator can be fitted as an extra; they do not interfere with radio reception, and the "Pixie" has a motor, case and blades which are all made of variously coloured bakelite.

G.E.C. fans are adaptable for table or bracket use, and the non-oscillating pattern is adjustable so that the direction of air projection can be varied. All are fitted with regulators, of the resistance type or choke type for the larger a.c. fans; universal models are also available.

The Gilbert range includes uncommonly shaped blades and wire guards. One type has "marine-shaped" propeller blades, others are mounted on floor standards, and table fans are supplied which do not interfere with radio reception.

The base and wire guard of the Graham Farish table fan are of unusual shapes; the fan is rated at 50 W and finished in a range of colours.

In the Westinghouse series of fans there are adjustable floor pedestal models and the "Cozy-Blo" coloured table cabinet with a circular grille through which air is blown by a fan after passing through a heater coil; it is loaded at 1,320 W for a.c. only.

"Elexcel" floor stand towel rail

The Winsor (Vent-Axia) fans are silent and easily installed by cutting a hole in a door panel or glass window. They are attractively designed, and both the rotor and casing are made of phenol (moulded by De la Rue). Veritys also make a range of fans; indeed this is a class of business in which they have specialised for many years.

One of the principal bathroom fittings nowadays is a heated towel rail. The Benham "Electro-vapour" pattern is tubular and filled with water, which is kept warm by a 175-250 W heater attached to the bottom rail.

The British National model is for wall fixing, having two rails above and a single 125-W J.P. tubular heater below. Bulpitt's new low-temperature heater (100-200 W) is arranged to be screwed to the wall or floor in an airing cupboard or bathroom. It has a perforated metal cover with a projecting rail above.

Eastwood's towel rails are filled with water which is heated electrically; loadings range from 150 to 400 W, and one model is combined with a wall radiator. The "Elexcel" is unusual in that it is not a fixture, but can be stood on the floor anywhere; the lower 200-W heater rod has a perforated canopy. The English Electric "Handidrier" for light articles is small enough to be stood inside a wardrobe. G.E.C. 200-W towel rails are offered for wall and floor mounting, having a slotted guard over the heater.

Dish-washing machine (H. W. Rodda & Co.)

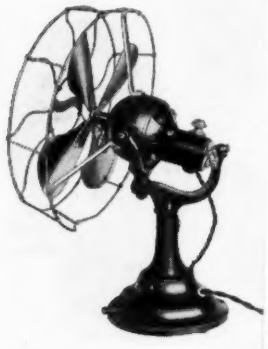
Downham cabinets for recessing into the wall have a centre compartment panelled with frosted glass and illuminated mirrors which throw light on the sides of the face as well as the front. Similar cabinets are made for mounting above wash-basins, with illuminated side panels.

The Vidor shaving mirror will stand or hang; light from a torch battery lamp clipped on behind is directed on to the user's face through a circle of clear glass in the lower quarter.

The distinguishing features of the Auto-Maid "Gem" hair dryer are its small size and compact shape. The air intake is at the back of the metal case, so reducing the risk of hair being drawn into the blower. It will operate at any voltage between 200 and 250 V, and the combined fan and heater loading is 400 W. Brown Bros.' "Duco" is similar, while the 500-W Bulpitt is finished in coloured bakelite and has a universal motor.

The Calvete "Ultra" hair dryer has an extra large air aperture, and the Cooper-Stewart metal dryer has a bakelite handle into which is built a very convenient form of switch. Other models are coloured, have a mirror built into one side and twin switches for the motor and heater; they are among the smallest available (8 in., 28 oz.).

The Elexcel bakelite machine has separate switches in the handle for the blower and heater and a storage box is obtainable that also serves as a stand for the dryer when in use, similar to the Ormond. Other suppliers include Falk, Stadelmann.



A Veritys fan

An adjustable table stand is obtainable for the 650-W G.E.C. bakelite dryer, while the 900-W aluminium model has an exceptionally large-diameter nozzle. The Gilbert machines have rectangular nozzles and are enamel finished.

The temperature of the new Calvete hair curling tongs can be regulated for any texture of hair and automatically maintained by means of a rheostatic controller placed at the central hinge; a swivelling connector and lightweight flex are provided. The Falk, Stadelmann heater for curling tongs is a 150-W cylinder on insulated feet, of universal voltage, and the cylindrical G.E.C. model is of 80 W. The Westinghouse tongs are of 20 W, with a thumb switch in the handle. One of the Bondt models has two prongs, while the Permatome outfit for hair waving has ten curlers, each with an asbestos-covered heating element. The Dexter hair dryer has a thermostat that enables the temperature to be set at any point between 100 and 200 deg. F.

Electrically heated service trolleys on castor legs are household assets, for they enable food to be served hot, notwithstanding delays. The Bertram Thomas buffet dinner wagons comprise a hot-plate carving table top with or without a glass-sided hot cupboard below and multiple switches with extra plugs for kettles, toasters, &c., all served by one connection to the mains. Loadings range from 500 to 1,400 W, while thermostatic control and a lamp on a flexible support can be added. There are also electric plate warmers, cylindrical in shape with a roll shutter and rotary switch.

The W. T. French 200-W plate warmer is known as the "Mysto."

Smith's "Takalite" cigarette lighter

The "Elexcel" hot cupboards are supplied with and without castors; they have adjustable perforated shelves and sliding glass doors. The trolley has 400-W top and bottom heating and the cupboard a 300-W bottom element only, thermostatic control being an extra.

The Electrical Commodities beater is driven by a tiny motor and supplied with a glass mixing bowl graduated in pints, cups and ounces. The Gilbert drink mixer is of 40 W and the motor-driven juice extractors of 60 and 100 W, while the "Kitchen Kit" machine mixes, minces, grinds, &c., and has attachments for opening cans, shelling peas, and slicing.

The latest Guiterman kitchen "Mixmaster" is a universal machine with ten speeds. A small whipper, a drink mixer and a juice extractor are also offered, but for a.c. only. The new model "Handyfreeze" household ice-cream maker is for a.c. only, and is driven by a 60-W motor.

The 25-W Sloan "Handimixa" (a.c.) is small enough to fit over a cup or glass. It does not interfere with radio reception, and a new finger brake is situated conveniently on the top of the "Plaskon" motor case which stops the agitator when slight pressure is applied, restarting immediately when released.

The new Westinghouse mixer is known as the "Food Crafter." It is driven by a ⅓-h.p. motor and has three speeds, being universal and non-radio-interfering; there are accessories for chopping, slicing and extracting fresh fruit juices.

Henley's "Solon" soldering iron

The Hawkins' "Tecal" outfit for automatic tea making is of 2.5-pint capacity. The hot water is ejected into a teapot as soon as it has boiled, the switchgear being actuated by a Smith's electric clock, which can be pre-set as desired, and is also combined with a table lamp to match. The "Teesmade" is of 1.5 pints and the kettle is automatically switched off, while the reading lamp is switched on, but it has a separate switch, so that it can be used independently.

The "Newmectric" dish washer is rectangular, with an enamel table top, and depends for its action on strong jets of hot water; the portable model can be used in an ordinary sink, with the driving motor attached to the wall.

Food mixer (Westinghouse)

There is the Kent dish washer, while beside the Westinghouse cylindrical and rectangular machines mounted on castors there is a cabinet type with a built-in sink. The Rodda dish washer is of the surge tank type; a 1-kW immersion heater can be fitted if desired.

Glass-sided indoor aquarium tanks are supplied by Berkeley & Young with heating elements thermostatically regulated, and overhead lighting as an extra. The British National car bonnet heater is of the J.P. tubular type, loaded at 60 W. The 100-W Bulpitt is fitted with copper gauze vents and can be earthed. The "Desmo" car radiator heater is enclosed in perforated gauze and is provided with a separate earthing lead and clip. The G.E.C. 50-75-W cylinder is obtainable for low as well as medium voltages, and there is also the Moseley.

The "Ace" battery charger

The "Ediswan Tungar" is not a trickle charger, but a full-wave valve rectifier that enables the owner-driver to keep his car battery fully charged without the necessity of removing it from the car; the maximum d.c. output is 5 A at 15 V.

Partridge, Wilson battery chargers of various types are well known, as is the Westinghouse "Westric" trickle charger, which is of the metal-rectifier pattern and exceedingly com-

pact. The Philips valve type has a bakelite case, and the A.G. Electrical " Aco " trickle charger is in a metal housing.

Lister electricity generating plants are driven by petrol and Diesel engines, with generators of from 0.75 kW upward and for operation direct, with batteries, or fully automatic and arranged for radiator or water-tank cooling. There is, in addition, a range of domestic pumps driven by motors or engines and controlled automatically by a float switch.

The starting and stopping of Petter lighting sets is controlled by the demand for current from the associated battery, governed automatically by a master relay in series with the load. The engine starting current is small as the compression is relieved by a valve that is closed after a few seconds of motoring, which is limited by a safety cut-out. There are sets of 1-kW capacity driven by air-cooled petrol engines.

The Pulsometer " Midget " set comprises a small centrifugal pump mounted on the end shield of an electric motor, there being only seven component parts. The four sizes will deal with duties up to 45 gal. per minute, against total heads up to 170 ft. The motors are intended to run at either 1,400 r.p.m. or 2,850 r.p.m., and from ¼ b.h.p. up to 5 b.h.p. is required, according to the output and the head against which they will have to work.

Rhodes, Brydon & Youatt pumps include self-priming and small piston types; also small vertical patterns and an automatic outfit with a pressure storage tank compactly arranged and operating at 30 lb. per sq. in. for providing 300 gal. per hour.

Small-motor manufacturers include the English Electric, Veritys and the G.E.C. Small rotary convertors are made by the Electro Dynamic Co. and electrically driven lawn mowers of several sizes are manufactured by Messrs. Ransomes, Sims and Jefferies.

The Cooper-Stewart electric scissors are of 20 W, controlled by a thumb-press button and fitted with double-edged blades that may be turned and renewed. G.E.C. sewing-machine motors are of 50-60 and 85-115 W, controlled by a foot pedal with five speeds and off contacts. They are flat-sided for close fitting and can be easily attached by means of a screw. The Johnson " Jecolite " needle lamp for sewing machines has a shaped reflector and push-bar switch, conveniently arranged with a wing-nut clip-on device. Beside the Singer sewing machines driven by small motors there is the Westinghouse series in various styles.

The bakelite Cooper-Stewart cigar lighter is 3 in. high. Smith's " Takalite " is quite separate from the base; it is simply pressed down to make contact for a few seconds, and when the element glows it can be removed from the base and passed round to light cigarettes, the case remaining cool.

The Rawlplug soldering iron is of 80 W, and there are no threads in the heat-conducting part; the handle-retaining screw can be used for earthing. Henley's " Solon " 65-W iron is fitted with a pencil bit, which is easily removable. The complete bit forms two distinct parts: the holder in which the element is clamped, and the round pencil which fits into a drilled hole at the top of the holder and is retained in position by a small stainless grub-screw. Provision is made for earthing.

Phœnix telephones include small instruments suitable for inter-communication between rooms, while the Siemens-Schuckert instrument is particularly neatly contrived for household use.

All-electric Heating of Flats

Selection, performance, and cost data from a Paris installation

DATA relating to the planning and operation of an all-electric heating installation for a five-room flat, comprising two reception rooms, two bedrooms, kitchen, entrance hall, lobby, bathroom, are given by E. Gele in a recent issue of *Arts et Metiers*. The total cubic capacity is 7,250 cu. ft., and the installed capacity of electric heaters amounts to 13.5 kW. With thermostatic control maintaining a temperature between 63.5 and 65.25 deg. F., the total cost of electricity consumed, excluding water heating, averages 2s. 7½d. (at 76 fr.=£1) per day during the winter at 0.713d. per kWh.

The installation is planned on the basis of heat losses per hr. per sq. ft. for each deg. F. difference in temperature, as follows: Windows, 0.82 B.th.u.; outside walls, 0.41 B.th.u.; floor and ceiling, 0.205 B.th.u. In addition, allowance is made for heating one change of air per hr., the heat required being: Volume in cu. ft.×density (=0.0812 lb. per cu. ft.)× specific heat (=0.2375)×deg. F. rise.

Allowance is made for an outdoor temperature of 23 deg. F., and the required indoor temperature is 64.5 deg. F., corresponding to a temperature difference of 41.5 deg. F. The temperature above the ceiling and below the floor is taken as 32 deg. F., giving a gradient of 32.4 deg. F. Then, for a room 12.25 ft. by 14.44 ft. by 8.99 ft. high, with one outside wall and a window 5.91 ft. by 6.56 ft., the losses per hr. are:

Window: $5.91\times6.56\times0.82\times41.4$	=	1,320 B.Th.U.
Ceiling: $11.25\times14.44\times0.205\times32.4$	=	1,080 B.Th.U.
Floor: Ditto	=	1,080 B.Th.U.
Wall: $[(11.25\times8.99)-(5.91\times6.56)]\times0.41\times41.4$	=	1,056 B.Th.U.
Air: $11.25\times14.44\times8.99\times0.0812\times0.2375\times41.4$	=	1,170 B.Th.U.
		5,706 B.Th.U. = 1.7 kWh.

As energy is taken for only 16 hr. per day, the loading of the storage-type radiator required is $1.7\times24/16=2.55$ kW.

Repeating the above calculations for the other rooms, the requisite loadings and the ratings actually adopted are as follows:

	Calculated kW.	Actual kW.
Kitchen	1.0	1.0
Dining room	2.55	2.5
Drawing room	3.2	3.0
Two bedrooms (2.6 kW. each)	5.2	5.0
Entrance lobby, bathroom, etc.	1.8	2.0
Total	13.75	13.5

On the total cubic capacity of 7,250 cu. ft., this is an average of 1,860 W per 1,000 cu. ft.

There is also provided a 22-gall. storage-type water heater requiring, for a temperature rise from 59 deg. to 203 deg. F., an electrical input of: $220\times(203-59)/3412=9.3$ kWh, corresponding to a heating period of about 4½ hr. with a 2-kW element, and bringing the connected load of the complete installation up to 15.5 kW.

The supply tariffs available are: (1) Sliding tariff down to 0.79d. per kWh at 110 V; (2) three-rate tariff for 220-V supply, 0.713d. from 11 a.m. to 2 p.m. and from 6 p.m. to 7 a.m., 2.18d. from 7 a.m. to 11 a.m., and from 2 p.m. to 3 p.m. in winter, and 4.78d. from 3 p.m. to 6 p.m. The most economical arrangement is clearly the " night tariff," 0.713d. per kWh, which involves restricted-hour working, with dependence on storage between 7 a.m. and 11 a.m. and between 2 p.m. and 6 p.m., *i.e.*, for two four-hour periods separated by three hours working from 11 a.m. to 2 p.m. and thirteen hours working from 6 p.m. to 7 a.m. An electric clock, with a relay actuating a switch, cuts off current during the high-tariff hours.

Direct heaters, with no appreciable storage capacity, are used in the bedrooms, cheap supply being available from 6 p.m. to 7 a.m. Storage-type heaters, effective for about eight hours after interruption of current, are used in all the other rooms with complete satisfaction, the maximum actual period of unavailability of supply being only four hours.

As all the rooms radiate more or less directly from the entrance, a thermostat was installed at that point to maintain a temperature of 64.5 deg. F. regardless of outdoor temperature. This has proved satisfactory, the thermostat differential being 63.5 to 65.25 deg. F. The heat then stored in the radiators merely balances the wall and window losses.

The capital cost (76 fr.=£1) was as follows: Wiring, £19 16s.; radiators (six), £82; control gear, £19 2s.; water heater, £18 8s.; total, £139 6s., or an average of about £20 per radiator ready for service, excluding the water heater. Most of the equipment can be obtained on hire or hire-purchase, which is not the case with steam or water-heating equipment.

The total consumption of energy during the six winter months, from September 28th, 1935, to March 17th, 1936, was: 9,700 kWh at 0.713d. (£28 16s. 4d.), and with the hire of meter and service (£3 2s. 9d.) the total cost was £31 19s. 1d. From this must be deducted the consumption of the water heater, given as 9.3 kWh every other day, or about $9.3\times15\times6\times0.713d.=$£2 9s. 8d. for the six months, leaving £29 9s. 5d. for the room heating.

The saving of labour in attending to fires and cleaning is estimated at £4 15s. for the winter, so that the net cost of the electric heating is about £24 14s., or approximately 2s. 7½d. per day for the whole flat during the winter. If the temperature falls below 64.5 deg. F. at any time of the year the heaters are switched on automatically, and there is always hot water available at 203 deg. F. at 0.3d. per gal.

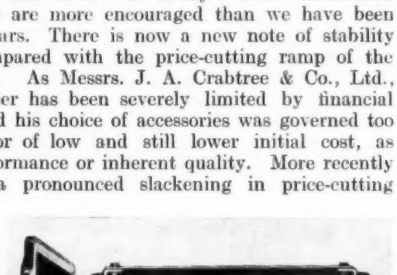
The average daily consumption for heating (excluding water heating) was 87.8 kWh during the coldest month of last winter, corresponding to an average load of 87.8/16=5.49 kW, compared with the installed capacity of 13.5 kW, leaving ample margin to meet the requirements of extra-cold weather and to ensure rapid heating at all times. The only saving effected by reducing the kW capacity would be a relatively small reduction in capital expenditure; the running cost (kWh consumption) would remain the same under thermostatic control.

I.I.

Installation Accessories

Developments in domestic electrical services make new or modified fittings and accessories essential

IN commencing this review of to-day's home installation accessories we are more encouraged than we have been for several years. There is now a new note of stability in quality as compared with the price-cutting ramp of the depression period. As Messrs. J. A. Crabtree & Co., Ltd., put it, the engineer has been severely limited by financial considerations, and his choice of accessories was governed too often by the factor of low and still lower initial cost, as distinct from performance or inherent quality. More recently there has been a pronounced slackening in price-cutting tendencies following the cheapening of money, and the demand now is increasingly for products offering designs that make for long life and a higher margin of safety.



"Botrade" tilting fuse distribution board

Messrs. Crabtree & Co. find the new trend entirely to their liking, mainly because the high quality accessory works out cheaper in the long run. Although a large proportion of the blame for inferior accessories may have attached to the supply engineer, the suppliers of such fittings must share the responsibility for the many sins against the canons of good installation practice. It is satisfactory, however, to be able to report that the change of attitude in connection with the major demand and the tightening up of regulations are likely to create a much more favourable outlook.

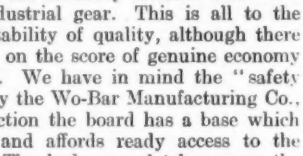
The introduction of cooking and heating into the home has turned the limelight on to the plug and socket and the heavier duty equipment. But we believe that, at any rate from the average electrical contractor's point of view, lighting installation work will be the mainstay for many years to come. We should say that the trend with regard to lighting-circuit controls is, first, towards accessibility and easy wiring of the distribution board, and, secondly, towards the heavier casing type of equipment because of the increasing tendency to put the fuse board in less protected positions, together with control gear for the heavier duty equipment.

McGeoch H.O. fuseboard

The detachable front teak fuse board is one excellent scheme which makes for easy wiring, and the latest design produced by Messrs. S. Bill & Co., Ltd., embodying this principle, renders it now unnecessary to remove the pins. The movement of a simple locking lever allows the front to be immediately taken away from the fuse batteries. Furthermore, with the locking lever in position the case is perfectly hinged and cannot accidentally become detached. A modification of this idea in principle is a double reversible hinge on the "Botrade Vertex" ironclad distribution board which allows the cover to be hinged either way. Perhaps an even more interesting feature relating to this equipment is the easy access given to the fuse terminals by virtue of the tilting fuse banks.

A special teak-case fuse board produced by the Foster Engineering Co., Ltd., and suitable for all types of wiring systems is so designed that all wiring work is effected from the front while the board is in position, yet all the live parts are protected from the cables. The fuse banks of an "Apex" ironclad board can be tilted, raised or withdrawn by loosening the side wing screws, and when tilted they can be held in position by these screws for easy wiring. There are special ironclad boards of the same make for fuses smaller than 15A, and front wiring is also a feature of these.

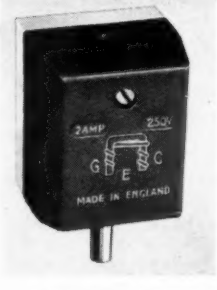
The increased use of the cartridge fuse in the domestic field is one more example of the tendency towards a common design for domestic and industrial gear. This is all to the good, for it leads towards stability of quality, although there must be a limit to this more on the score of genuine economy than deliberate price-cutting. We have in mind the "safety first" fuse board produced by the Wo-Bar Manufacturing Co., Ltd. Of all-bakelite construction the board has a base which carries all the connections and affords ready access to the mains and service wires. The body completely covers the base, and when screwed into position all the live parts are shrouded. The fuses are inserted, and a cover is attached by an insulated-head captive screw. The fuses of the "Warwick" open-back and solid-front teak fuse board manufactured by Messrs. William McGeoch & Co., Ltd., are of H.O. pattern with copper knife contacts and specially formed phosphor-bronze clips which give constant pressure over a large contact area. The main and circuit wires may be removed without interfering with the fuse banks.



Crabtree multi-gang switch unit

We are impressed by the easily removable fuse banks of a wide range of teak, cast-iron and pressed-steel fuse boards produced by the General Electric Co., Ltd. There are teak units available with both open and solid backs, and pressed-steel units have "knock-outs" to facilitate conduit entry. We confess to a liking for the combined switch and distribution board, although this often means a departure from the idea of centralised control of main equipment in favour of centralised local control. Fitted with "Nipper" and "Landor" switches such combinations with up to eight ways are listed by the G.E.C. Siemens Electric Lamps and Supplies, Ltd., have an interesting range of ironclad combined units, some with "Zed" fuses and internally operated tumbler switches, and others with either "Zed" or bridge fuses and rotary switches. There are also externally operated switch banks combined with fuse boards with a separate door.

One of the most interesting developments in lighting switch practice is the short slow break introduced by Messrs. J. H. Tucker & Co., Ltd., in a range of switches for a.c. work. Experiments have shown that reduction in the speed of operation and the short length of break reduces the arc to a mere pin point compared with the extended flash of a quick-break arc. In a temperature test in which a quick-break and a short slow-break switch were operated on the same circuit and with the same duty, the temperature rise at the contacts of the slow-break unit was less than half that of the quick-break unit. The result of reduced arcing should greatly reduce pitting and burning of the contacts.



G.E.C. door switch

Apart from improvements in appearance perhaps the major developments in switch design are the vastly increased use of bakelite, particularly for covers, the lever-action handle type of switch with a cover usually held on by two separate screws, and, of course, advances in movement design. The "Slot" switch produced by M. K. Electric, Ltd., is a good representation of all three of these trends. Of similar design to the company's foot-press switch this all-insulated unit has a rocker roller movement with a long flexible tension spring bearing on metal rollers.

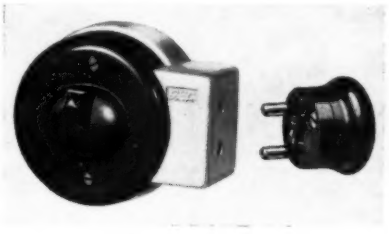
Simplicity of movement is the keynote of M.K. tumbler

switches in which there are no trunnions nor brackets for supporting the spring which has more than six inches of steel wire. The slot principle is also embodied in the "Lincoln" switches (Crabtree) with their all-steel mechanism and substantial china block carrying the floating contact rod. Neat and substantial multi-gang units for both "Lincoln" and "Standard" switches are a feature of the Crabtree range. The "London" and "London Junior" under-slung switches produced by Messrs. A. P. Lundberg & Sons, Ltd., are also representative of modern trend. They all have bakelite covers, while the junior model has one-piece double-leaf contact springs. To ensure silence of operation the movement of the "London" is rubber mounted. The "Temco" switch made by T. M. C.-Harwell (Sales), Ltd., has very few moving parts and no "dead spot." The "London Senior" is shown in a recent G.E.C. progress sheet. Rated at 15 A it has a brass dolly and plate fixing rings.

The steatite link action is a feature of the G.E.C. "Slick" switches and also of the "Stone Link" switches with the double-leaf phosphor-bronze contacts introduced by Messrs. Julius Sax & Co., Ltd. A "Tenby" unit (Messrs. S. O. Bowker, Ltd.) is the "Pilot," which has a long break despite the shallow dimensions, while Lundberg special-purpose switches include an inductive-circuit tumbler with means for dissipating energy arising from an inductive d.c. circuit break, the "Marvel" three-position switch for variable and restrictive controls of two lamps from two positions and the "intermediate" switch with its arc-preventing grooves in the porcelain base for the switch blades.

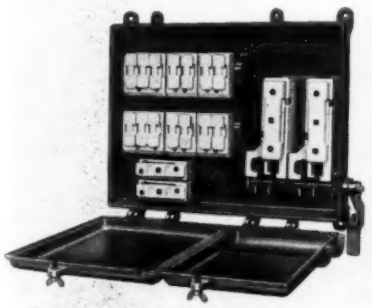
1. "Wylex" PW. plug and socket. 2. Lundberg "Edgewise" switch-plug. 3. British General 15-A switch-plug. 4. Tucker 15-A short slow-break switch. 5. Lighting Trades solid-plunger lampholder. 6. Anti-vibration lampholder (Harold Ashton)

Three selected suspension switches indicating modern practice are the Crabtree unit, the mechanism and nickel-silver contacts of which are mounted on "Jacelite" plates; the Lundberg momentary push switch with its push-button control and automatic spring return; and the "Nettle" (Messrs. Victor H. Iddon, Ltd.) pear unit which makes an effective cord grip between the cap and inner insulating cone automatically and in which the snap action is entirely air insulated. Because of its high safety factor when used in such places as bathrooms and also because of economy in wiring the ceiling switch is assured a long life.



G.E.C. switch-plug

For use with conduit systems there is now a "Sincord-Major," which has a larger base with 2-in. fixing centres for mounting on suitable boxes. In the model produced by the Wandsworth Electrical Manufacturing Co., Ltd., for vertical or horizontal mounting there is a robust solder-link chain with a turned-metal cord connector and bakelite break-joint rings. The Crabtree "Lincoln" has a 2-in. diameter base and adaptor rings are available for use with B S iron boxes. The "Landor" and "Landor Junior" have 2½-in. and 2-in. bases (1⅝ in. and 1¼ in. fixing centres), the former being available in single-cord and fish-tail patterns. The door switch should not be looked upon as merely a luxury, and a G.E.C. model offers the following operation sequence: door open circuit closed, door closed circuit remains closed, door open circuit open, door closed circuit remains closed. Arrow Electric Switches, Ltd., are responsible for a push-on push-off switch for table lamps, 1 in. long, ¾ in. wide, ⅜ in. deep.

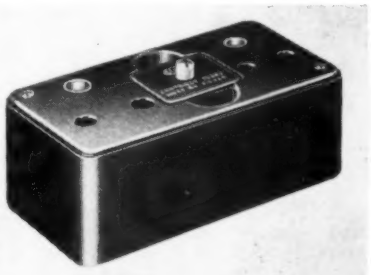


"Apex" fused splitter

The overall bakelite cover is perhaps the most modern note in ceiling-rose development. A G.E.C. model has a 2½-in. diameter cover, 2-in. centres fixing holes and large terminal pillars. A twin ceiling rose of the same make has two points on the same base, one for the bed drop-switch and one for the lamp. Porcelain interiors are stressed for "Nettle" bakelite roses as a safeguard against surface creeping. The terminals of roses produced by Ashley Accessories, Ltd., have holes for the outgoing leads as well as for the house wires. A Lundberg detachable rose has a plug-and-socket connection so that the fitting can be temporarily disconnected.

Extended use of bakelite and the solid plunger represent the general movement in the lampholder field. Lighting Trades, Ltd., produce a lampholder with both these features. In pointing to the revised B.S.S. No. 52, Messrs. J. H. Tucker & Co., Ltd., say that their "Titan" and "Kwikwire" holders fully comply with it. A feature of the "Titan" is the interlock between the metal liner and the "Telacite." Whilst plastic, the moulding material is forced into anchorage slots. The metal liner of the "Lincoln" (Crabtree) holder is strengthened by a corrugated and beaded rim which also has an effective key. For white moulded lampholders Messrs. Victor Iddon recommend the heavy type in which there is an air space between the moulding and the heated brass sleeve. The moulded parts screw direct on to steatite-threaded interiors. Finger-grip projections on the shade carrier and solid plungers, separately sprung, are features of a moulded batten lampholder introduced by the Ormond Engineering Co., Ltd., which has a completely embedded metal liner and "knock-outs" for surface wiring. G.E.C. brass switch lampholders are available in both the push-bar and single-chain types.

Wear of the flexible lead at the lampholder entry can be overcome by such protection devices as the flexible protector and anti-vibrator produced by Messrs. Harold Ashton. Secured at one end to the lampholder, a spring around the flex finishes in a cord-grip a short way up the lead. An up-to-date lampholder-adaptor idea is the Lundberg "Adjustable" adaptor which permits a connection between a lampholder and a socket. The adaptor can be fitted to suit any one of three B.S. gauges. The two-way adaptor such as that produced by the G.E.C., with its switch controlling the lower lampholder for the lamp is now a necessity in many homes blessed with an electric iron. The "Goltone" pear-switch conversion attachment produced by Messrs. Ward & Goldstone, Ltd., is perhaps the last word in lampholder equipment. The supplementary outlet of the two-way adaptor provides a pear-switch connection, so that it is easy to convert any bed light without a drop switch.



M.K. dual socket unit

The advance of domestic heating and cooking has been reflected in the installation-equipment field in a rather curious manner. The original ironclad main switch gear and fuse gear was called to service for circuit controls, the switch-fuse demanded by heavy-duty circuit work was soon used for main controls, the main switch-splitter is now common sub-circuit

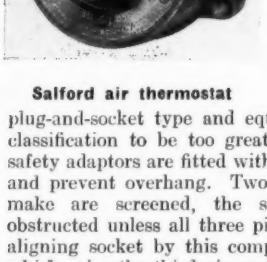
equipment, and bakelite was no sooner employed for circuit work than it became normal main equipment. The result is that the old definite line of demarcation between main and circuit gear has now almost disappeared.

A very interesting classification scheme, however, has been presented to us by Messrs. S. Bill & Co. who, for the main control of "domestic apparatus and materials," offer the "Invicta" switch-fuse, the switch movement of which is vitreous china. The copper brushes are pressed clamped through a solid bakelite brush bar. The "Ultra 30" switch-fuse, also for main control, is of the "Botrade Q" design, top and bottom wiring being arranged for with large unobstructed passages. The "Ultra 10" switch-fuse with arc-damping type fuses with the correct size fuse-wire is recommended for lighting main-switch work, and it is so compact as to be fixable on a 4-in. by 4-in. block. The "Invicta" repeated as an all-insulated switch splitter is recommended for fire controls. The cover is hinged at the bottom and a 30-A two-circuit unit measures 7¾ in. by 7¼ in. by 3¾ in. In one G.E.C. d.p. all-insulated switch-splitter we see the idea extended to two sizes of control, one 30-A and two 15-A fuses per pole. Specially designed by the same company for house or flat main distribution, a control unit consists of a combined 50-A main switch and fuses with a distribution board with one 30-A way for a cooker with 15-A ways for lighting and heating.

Rheostatic cooker thermostat

As an example of the increasing importance of all-insulated gear the Midland Electric Manufacturing Co., Ltd., points to the "Memroy," in which cables may be brought in from the top, bottom or back. Live terminals are deeply recessed but accessible. The small two-way "Memset" splitter unit now has a capacity of 20 A. "Apex" all-insulated switch-fuses and splitter equipments are of the porcelain-block type, but with hinged covers, while fused splitters of the "dis."-board type include one of the box and hinged door construction, with the fuses of the sub-circuits protected by a separate non-interlocking door, so that fuse carriers can be withdrawn while the switch is "on."

Metal-clad weatherproof switch-fuses are made by Messrs. Reyrolle mainly for industrial work, but we suggest that they are very suitable for controls in kitchens and outhouses. The movement is double-make and break on each pole, and the self-aligning double-ended terminal contact blocks are deeply recessed into a porcelain base which forms an effective phase-insulating barrier. A local fuse unit which enables advantage to be taken of the diversity factor now permitted under R. 4D of the I.E.E. Regulations is the fused point box produced by M.K. Lighting sockets can be looped from power sockets, the fused point box providing protection for the looped circuits.



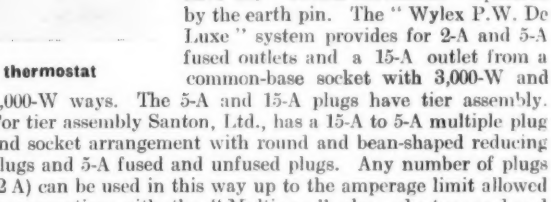
Salford air thermostat

Apart from such broader divisions as multiple plugs, switch-sockets and automatic switch-action plugs and sockets, we find the many and greatly increasing refinements to the plug-and-socket type and equipment so widely varying for classification to be too great a task. M.K. anti-flash fused safety adaptors are fitted with screens which isolate the sockets and prevent overhang. Two-A anti-flash sockets of the same make are screened, the socket entries being completely obstructed unless all three pins are properly inserted. A self-aligning socket by this company has a spring trigger device which grips the third pin as it is thrust home and prevents its withdrawal until the projecting trigger is depressed. Safety plugs and sockets produced by Messrs. William Sanders & Co. (Wednesbury), Ltd., have a shield for the live contacts, which is operated by the earth pin, the socket remaining covered until the plug pins have actually entered the cover.

In the Sanders "Shutterlocked" switch-socket the shield is interlocked with the switch by an arm which stops the shield from moving, thereby preventing the plug from being inserted without first switching off. A 15-A two-pin switch-plug produced by the British General Manufacturing Co., Ltd., has a slot-type switch with a top-entry plug and a novel cord-grip. The "Tenbyluxe" 5-A switch-socket has one-piece socket tubes, the earth socket being securely fastened to the earth terminal plate; a shutter mechanism is embodied. The G.E.C. 2-A non-interlocking switch-plug incorporates a "Nipper" switch with the socket embodied in an extension of the porcelain base. Tucker surface switch-socket outlets are very attractive, with their square bakelite switch cover and top-entry plug.

The Crabtree "Compact" switch-socket is in side-by-side formation, and outstanding features are the non-overhang cover and the shrouded-pin plug. The D-shaped plug is a distinctive feature of the "Temco" switch-plug, with its wide slot-type switch dolly. The Reyrolle interlocked switch-plug has a rotary switch movement operated by a ring on the case concentrically around the socket.

Among automatic switch plugs are the "Golden Arrow" (Messrs. J. Toubkin); the Wandsworth and the "Wylex" (Messrs. G. H. Scholes & Co., Ltd.). All have the "switch movement" operated by the earth pin. The "Wylex P.W. De Luxe" system provides for 2-A and 5-A fused outlets and a 15-A outlet from a common-base socket with 3,000-W and 1,000-W ways. The 5-A and 15-A plugs have tier assembly. For tier assembly Santon, Ltd., has a 15-A to 5-A multiple plug and socket arrangement with round and bean-shaped reducing plugs and 5-A fused and unfused plugs. Any number of plugs (2 A) can be used in this way up to the amperage limit allowed in connection with the "Multiway" plug adaptor produced by Messrs. Davies, Kent & Stewart, Ltd. The "Grelco" multi-plug adaptor produced by the Grafton Electric Co. will accommodate 15-A or 5-A plugs on either of two branches, and so will the "Five Fifteen," which will also accept, in addition,

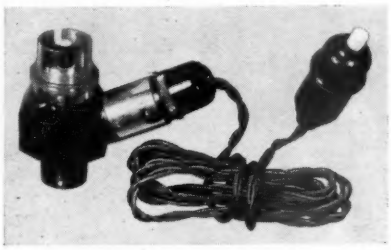


Sun-Vic glass-sealed thermostat

a 15-A plug at a third outlet. M.K. 2-A twin-socket adaptors have self-adjusting and self-aligning spring sockets.

Cooker and water-heater equipments still arouse the greatest interest in respect of normal switching control of domestic apparatus, and the methods of indication (pilot lamp or a mechanical signal) have represented the main choice for the engineer or consumer. Now, however, we hear of both methods embodied in one control unit as in the latest "Ultra-neat" (Tucker) models. The kettle switch in this unit, by the way, represented the initial commercial development of the slow-break switch to which we have referred. Simple switch and pilot-lamp units made by this company are available as multiple units in up to six sections. An "Apex" cooker switch with a "Wylex" socket is available with a mechanical indicator or a pilot light, and a similar unit without a plug is intended for water-heater control. M.E.M. claim that the "Memkuka" cooker-control unit has proved that it is possible to produce an inexpensive unit sufficiently attractive for installation in more accessible positions than those usually allotted to ordinary domestic control gear.

A new "Botrade" cooker unit has an "on" and "off" indicator and is fitted with a 30-A d.p. main switch, a 15-A. 3-pin socket and a 15-A, s.p. or d.p. switch. We learn that the 3,000 "Insulok" (15 A) is being widely used for water-heater control. M.K. have produced two sizes of water-heater unit, 5 A and 15 A, the latter having a d.p. "Slot" switch and d.p. fuses of the safety pin-and-socket type enclosed in a bakelite cover. There is also a pilot lamp suitably protected.



Ward & Goldstone pear-switch conversion attachment

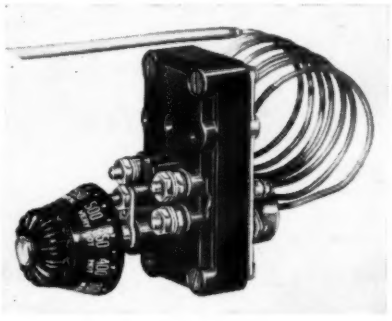
Santon aim at general-purpose use in their compact (6 in. by 3¼ in.) control unit, which has a single- or three-heat rotary switch and a neon indicating lamp with cartridge-fuse.

Pilot-lamp control units produced by Arrow Electric Switches, Ltd., aim at simple wall-switch control for all

kitchen equipment, and by reason of the wide range of rotary and tumbler switches available for incorporation in them they can be supplied in s.p., d.p. and t.p. types in sizes from 3 to 50 A. A development of the earth-leakage trip switch designed by Messrs. Reyrolle as a solution of earthing difficulties in areas where low-resistance earths are not available is the cooker-control unit fitted with earth leakage and overcurrent protection. The plug and socket are included in the leakage trip-coil circuit, so that auxiliary loads are also protected. By its disc construction a new Santon rotary cooker switch can be made to provide six switching positions in a single rotary movement. Two recent appliance connector developments are the "Anka" (Callender's Cable & Construction Co., Ltd.) outfit which is now supplied with a "Union" combined lampholder and plug adaptor, and the Ormond connector which has specially shaped contacts with tensioning tongues.

To encourage enonomy in electric cooking consumption Messrs. Everett, Edgcumbe & Co., Ltd., have devised a small ammeter scaled in pence per hour. Fixed on the control unit this creates a real interest in reducing consumption and obviates such mistakes as leaving full heat on when only half heat is required.

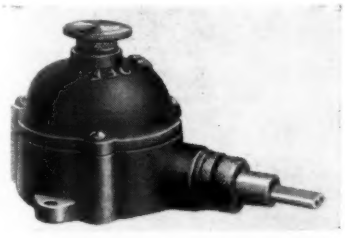
The slowly increasing attention given to automatic cooking control is responsible for the only marked advances in the production of special equipment for the automatic control of the heating elements of apparatus according to the temperature required in the oven, room or water heater. So successful has the thermostat been proved to be in the thermal-storage water-heater that nowadays it is scarcely mentioned by the supply man in connection with his maintenance problems. It is, therefore, obvious that there can be no real difficulty in the production of control equipment for cookers if it is wanted.



Arrow cooker thermostat

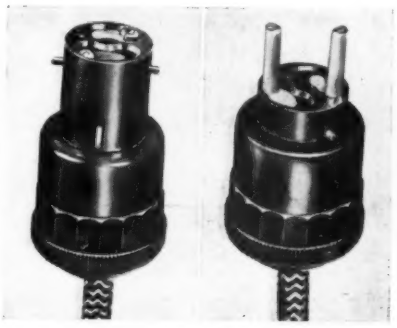
The latest entry in the cooker-thermostat field is a G.E.C. unit which is easily adjustable and has numerical scale markings with "heat numbers" of 0, ¼, ½, ¾, 1, 2, 3 . . . . 12. It is curious that one of the main controversial points on such an important question as automatic cooking control should turn on this question of scale markings. The "Satchwell," of Rheostatic Co., Ltd., is completely calibrated for 200 deg. F. to 500 deg. F., and provided with an "off" position. The remote-control rod is adjustable in length to suit any size of cooker, and a simple universal joint enables the thermostat to be mounted in any position in relation to the position of the dial. "Diamond H" Switches, Ltd., have devised a special attachment which permits their thermostat to be adapted to cookers already out in service and provided with three-heat control. A special mounting plate assembly is fixed to the thermostat, and it is merely necessary to drill a 2⅜-in. hole in the cooker switch panel through which two clamping straps are fed before tightening them up.

A contrast to the expansion-rod type of thermostat is the model produced by Arrow Switches, in which a sensitive liquid operates bellows, the movement of which is transferred by a flexible shaft. It can be fitted in any oven position, and the control panel incorporates a snap-action switch with silver-butted contacts. Round and rectangular room thermostats are produced by Salford Electrical Instruments, Ltd. The former type has a range of 40 deg. F. to 130 deg. F., and will deal with loadings up to 15 A, while the latter type has a range of 45 deg. F. to 75 deg. F. for the same loading in the case of one model with a self-contained switch. While the "Satchwell Q" room thermostat is now totally enclosed (in fact it is hermetically sealed), its close sensitivity has been retained and its external appearance unaltered. The glass-sealed thermostat produced by Sun-Vic Controls, Ltd., operates in conjunction with a vacuum switch to control up to 2, 3.5 or 6 kW on 230 V d.c. or single-phase a.c., or up to 17 kW on three-phase circuits.



Weatherproof switch of B.I. paper twin-wiring system

While, we suppose, most of the house-wiring in this country is done with ordinary v.i.r. cable and conduit, increasing use is made of the wiring systems, including the three standardised systems produced by the members of Cable Research; British Insulated Cables, Ltd.; Callender's Cable & Construction Co., Ltd.; Enfield Cable Works, Ltd.; W. T. Glover & Co., Ltd.; St. Helens Cable Co., Ltd.; Union Cable Co., Ltd.; and W. T. Henley's Telegraph Works Co., Ltd.



"Anka" lampholder and wall plug

The three systems utilise ordinary lead-sheathed cables, lead-sheathed cables with a continuous bonding wire under and in direct contact with the lead, and c.t.s. type cable. Some of these manufacturers produce their own systems as well. Callender's "Kalibond," "Kaleeco," and c.t.s. systems are similar to the standardised ones, but the B.I. paper twin-wiring system, with its D-section cable conductors, cast-junction boxes and lead joints, is distinctive.

Of the special cables developed for domestic-appliance flexibles, there are the B.I. "Rockbestos," which has long-fibred asbestos insulation, Callender's "Ankaflex" which has cord strengtheners for attaching to the adaptor or wall plug to take pulls, and Henley's "Henliflex," in which special laying-up of the conductors and cores ensures a very high resistance to fracture.

Apart from external heat-insulation mattresses for application to converted tanks, such as those produced by Messrs. Drake & Gorham, Ltd., and the Arora Co., a heat-insulation development of interest to makers of self-contained apparatus is the glass silk produced by Messrs. Chance Brothers & Co., Ltd.

Diamond cooker thermostat plug

Electric bells still provide profitable business for the manufacturer and contractor. One produced by Ward & Goldstone is designed to prevent radio interference. It has no sparking contacts, and while it works normally at 6 or 8 V it can be converted to operate at mains voltage. A Julius Sax bell transformer is of good quality annealed soft grey iron castings with air spacings, and steel insulated laminated cores. There is an earth shield to prevent the supply pressure from reaching the bell circuit. A fused bell transformer in a circular bakelite case is a recent product of Messrs. Henry Peace, Ltd. It has an output voltage of 3, 5 or 8, and operates on a 200/230-V supply. A transformer produced by the British General Manufacturing Co. has a porcelain base and is fused in both the primary and secondary circuits. There is a metal screen placed between the primary and secondary windings and there is an earthing terminal mounted on the lamination clamping frame.

The sensitive element of a new room thermostat produced by the British Thermostat Co., Ltd., is housed in a vertical tube which is held by a bracket a little distance away from the wall. Thus, it is sensitive to the temperature of the air in the room and not to that of the wall. The instrument is suitable for directly controlling 10-A a.c. or 1-A d.c., 250 V. On the standard setting the differential is three degrees F., but a one-degree differential is available on a fine setting. Temperature operation is adjustable from 47 deg. F. to 75 deg. F.

Manufacturers Names and Addresses

BELOW we give the names and addresses of the manufacturers mentioned in the preceding articles for the guidance of readers who desire to secure further information :—

Abingdon Works (1931), Ltd., King's Rd., Tyseley, Birmingham.
Acelite, Ltd., Halesowen, Near Birmingham.
A.E.G. Electric Co., Ltd., 131, Victoria St., S.W.1.
A.G. Electrical Co., Ltd., 28, Station Rd., Acock's Green, Birmingham.
Aidas Electric, Ltd., Sadia Works, Park Av., North Circular Rd., London, N.W.10.
Air-Way, Ltd., Abbey House, Baker St., N.W.1.
Air Conditioning, Ltd., 4-12, Palmer St., S.W.1.
Aladdin Industries, Ltd., Greenford, Middlesex.
Allen, E., & Sons, St. John's Rd., Summerhill, Tipton, Staffs.
Arora Co., Loughborough, Leicester.
Arrow Electric Switches, Ltd., Hanger Lane, Ealing, W.5.
Ashley Accessories, Ltd., Finch Place, Falkland St., London Rd., Liverpool.
Ashton, H., Bull's Head Passage, Market Place, Manchester.
Auto-Maid Vacuum Cleaner Co., 62, Blandford St., W.1.

Bakelite, Ltd., 68, Victoria St., S.W.1.
Balcombe, A. J., Ltd., 52, Tabernacle St., E.C.2.
Bastian & Allen, Ltd., 14, Church Rd., Hanwell, W.7.
Bell Fireplace Co., Kingswell Works, Northampton.
Belling & Co., Bridge Works, Southbury Rd., Enfield.
Benham & Sons, Ltd., 66, Wigmore St., W.1.
Benjamin Electric, Ltd., Brantwood Works, Tariff Rd., Tottenham, N.17.
Berkeley & Young, Ltd., Tyseley, Birmingham.
Berry's Electric, Ltd., 85, Newman St., Oxford St., W.1.
Bertram Brice, 42, Castle Hill Rd., Hastings.
Bertram Thomas, Worsley St., Hulme, Manchester, 15.
Bill, S., & Co., Ltd., 146, Queen's Rd., Aston, Birmingham.
Bobin, Maurice, 15, Farringdon Av., E.C.4.
Bondt, A., 34, Lancaster Rd., W.11.
Bowker, S. O., Ltd., Tenby Works, Regent Row, Birmingham.
Bratt, Colbran & Co., 10, Mortimer St., London, W.1.
Bray, Geo., & Co., Ltd., Leeds.
Brightglow, Ltd., Oaklands Rd., Cricklewood, N.W.2.
British Development Co., 79, Petty France, Westminster, S.W.1.
British Electric Domestic Appliances, Ltd., Bedal Works, King's Way, Waddon, Surrey.
British Electric Equipment Co., Ltd., 12, Norfolk St., W.C.2.
British General Manufacturing Co., Brockley Works, 2, Tyrwhitt Rd., Lewisham, S.E.4.
British Insulated Cables, Ltd., Prescot, Lancs.
British National Electrics, Ltd., Newarthill, Lanarkshire.
British Thermostat Co., Ltd., Teddington Works, Windmill Rd., Sunbury.
British Thomson-Houston, Ltd., Crown House, Aldwych, W.C.2.
British Trane Co., Vectair House, Newcastle Place, London, E.C.1.
British Vacuum Cleaner & Engineering Co., Ltd., Parson's Green Lane, S.W.6.
Brown Bros., Ltd., 20/34, Great Eastern St., E.C.2.
Bulpitt & Sons, Ltd., Swansea Works, Birmingham, 1.
Burnley Components, Ltd., Rose Grove, Burnley.
Bustler Electric Co., Ltd., 1a, Watling Avenue, Burnt Oak.
Bylock Electric, Ltd., 109, South St., Ponders End, Middlesex.

Cable Research, Silver St., W.C.1.
Caird, Chandler & Co., Ltd., 29, Great St. Helen's, E.C.3.
Calvete, I., Ltd., 59, North St., Clapham, S.W.4.
Carron Company, Carron, Falkirk.
Catterson-Smith, R. M., Adams Bridge Works, Wembley.
C.C.A. (Vacuum Cleaners), Ltd., 138, Lever St., E.C.1.
Coldair, Ltd., North Circular Rd., N.W.2.
Conditionair, Ltd., Denison House, Vauxhall Bridge Rd., S.W.1.
Cooper-Stewart Engineering Co., Ltd., 136, Long Acre, W.C.2.
Corfield-Sigg, Ltd., Trafalgar Works, Merton Abbey, S.W.19.
Crabtree, J. A., & Co., Ltd., Lincoln Works, Walsall.
Crittall, R., & Co., Ltd., Bush House, Aldwych, W.C.2.

Dayanite Radiators, 77, Grosvenor Rd., S.W.1.
De La Rue & Co., Ltd., Telenduron Works, Shernhall St., Walthamstow.
Dernier & Hamlyn, Ltd., 23, Newman St., W.1.
Desmo, Ltd., Stafford St., Birmingham, 4.
Dexter Manufacturing Co., Ltd., 22-23, Dean St., W.1.
Diamond H Switches, Ltd., Gunnersbury Avenue, W.4.
Dixon, R. G. & Co., Ltd., 116, Victoria St., S.W.1.
Dizer, M. C., Ltd., Africa House, Kingsway, W.C.2.
Downham & Co., 46, Auckland St., S.E.11.
Dowsing Co. (Electrical Manufacturers), Ltd., Kangley Bridge Rd., Lower Sydenham, S.E.26.
Driver, W. T., 10, Store St., W.C.1.
Dugdale Manufacturing Co., Settle, York.

East London Rubber Co., 29-33, Great Eastern St., E.C.2.
Eastwoods, Ltd., 47, Belvedere Rd., London, S.E.1.
Easy Washing Machine Co., Ltd., 21, Liverpool St., E.C.2.
Edison Swan Electric Co., Ltd., 155, Charing Cross Rd., W.C.2.
Electric Art Shades (1928), Ltd., Feering Factory, Kelvedon.
Electrical Commodities, Ltd., Duke Street House, 415-417, Oxford St., W.1.
Electrix, Ltd., Dagenham.
Electro Dynamic Construction Co., Ltd., St. Mary Cray, Kent.
Electrona Electrical Products, Ltd., Friday St., Manchester.
Electroway Heaters, Ltd., Baxter Gate, Loughborough.
Elexcel, Ltd., Victor Works, Broad Green, Liverpool.
Enfield Cable Works, Ltd., Lincoln House, High Holborn, W.C.1.
English Electric Co., Ltd., Stafford.
E.R. Co., 21, Park Rd., Bromley.
Eureka Vacuum Cleaner Co., Ltd., 8, Fisher St., W.C.1.
Euston Manufacturing Co., Ltd., 143b, Euston Rd., London N.W.1.
Express Refrigerating Co., Ltd., 110, Cricklewood Lane, N.W.2.

Falk, Stadelmann & Co., Ltd., 83, Farringdon Rd., E.C.1.
Falkirk Iron Co., Ltd., Falkirk.
Ferranti, Ltd., Hollinwood, Lancs.
Foster Engineering Co., South Wimbledon, S.W.19.
French, W. T., & Co., Ltd., Mysto Works, Browning St., Birmingham.
Frigidaire, Ltd., Edgware Rd., The Hyde, Hendon, N.W.9.
Froy, W. N., & Sons, Ltd., Brunswick Works, Hammersmith, W.6.

General Electric Co. Ltd., Magnet House, Kingsway, W.C.2.
Gent & Co., Ltd., Faraday Works, Leicester.
Geyser Manufacturing Co. (1932), Ltd., 1, Goodwin St., Fonthill Rd., N.4.
Gilbert, A. C., & Co., 109, Kingsway, W.C.2.
Girlings, Ltd., Electricity Works, Fullbridge, Maldon, Essex.
Glover & Sons, J., 39-47, Groton Rd., Earlsfield, S.W.18.
Glover, W. T., & Co., Ltd., Trafford Park, Manchester.
Graham Farish, Ltd., Masons Hill, Bromley, Kent.
Green, Geo., & Co., "Gee-Gee" Works, Chapel Rd., S.E.27.
Greene, Phillips & Co., First Avenue House, High Holborn, W.C.1.
Guiterman, S., & Co., Ltd., 35, Aldermanbury, E.C.2.

Hague & McKenzie, Ltd., Sloan St. Parade, Birmingham.
Hanovia, Ltd., Slough.
Harcourts, Ltd., 21a, Newman St., W.1.
Hawkins, L. G., & Co., Ltd., 30, Drury Lane, W.C.2.
Heatrae, Ltd., St. George St., Norwich.
Henley's (W. T.) Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.
H.M.V. Household Appliances, Ltd., 363, Oxford St., W.1.
Hogan & Wardrop, Ltd., 25, Old St., W.1.
Hoover, Ltd., Perivale, Middlesex.
Hotpoint Electric Appliance Co., Ltd., 24, Newman St., W.1.

Iddon, V. H., Ltd., 29, Blackfriars St., Manchester, 3.
International Refrigerator Co., Ltd., 169, Regent St., W.1.
Inventum Electrical Appliances, Ltd., North End Rd., Wembley Park.
Ismay Zeros, Ltd., Dagenham.

Jackson Electric Stove Co., Ltd., 143, Sloane St., S.W.1.
Johnson & Phillips, Ltd., Charlton, S.E.7.
Johnson Engineering Co., 86, Great Portland St., W.1.
J.P. Tubular Heater Co., Newarthill, Motherwell.

Kandem Electrical, Ltd., 769, Fulham Rd., S.W.6.
Kelvinator, Ltd., 258, Gray's Inn Rd., W.C.1.
Kent Dish Washing Machine Co., Ltd., 190, Thornton Heath Rd., Croydon.
Kingsway Electrical Services, 54, Bloomsbury St., W.C.1.
Kitchendom, Ltd., Stadium Works, Wembley.
Knightshades, Ltd., Derby Rd. Works, Montague Rd., Edmonton, N.18.

Leda Electric, Ltd., Oldham Rd., Miles Platting, Manchester.
Lightfoot Refrigeration Co., Ltd., Bush House, W.C.2.
Lighting Trades, Ltd., 51, Garratt Lane, S.W.18.
Lister, R. A., & Co., Ltd., Dursley, Glos.
London Commercial Electric Stores, Ltd., 13, Farringdon Avenue, E.C.4.
London Electric Appliances, Ltd., 62, Glengall Rd., S.E.15.
Low, Archibald, Electrics, Ltd., Newarthill, Lanarkshire.
Lowne Electric Clock & Appliances Co., Ltd., Boones St., Lee, S.E.13.
Lundberg, A. P., & Sons, Ltd., 477, Liverpool Rd., N.7.

MacGregor & McCallum, Ltd., 1, Newman St., W.1.
McGeoch, William, & Co., Ltd., 46, Coventry Rd., Birmingham.
Marco Refrigerators, Ltd., Manor Works, Rowan Rd., Streatham Vale, S.W.16.
Medical Supply Association, Ltd., 167, Gray's Inn Rd., W.C.1.
Mek-Elek Engineering Co., Ltd., 16, Douglas St., Westminster, S.W.1.
Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.
Milliwatt Heating Pad, Ltd., 204-6, Great Portland St., W.1.
Mitchell Electric Co., Ltd., Meco Works, Wheeleys Lane, Five Ways, Birmingham.
M.K. Electric, Ltd., Wakefield St., N.18.
Modinstal Electric Co., 2 and 3, Oldham Terrace, High St., Acton, W.3.
Moffats, Ltd., India Mills, Blackburn.
Morphy Richards, Ltd., St. Mary Cray, Kent.
Morris, A., & Co., 46, Commercial St., E.1.
Morris Heating Appliances, Ltd., 59-61, New Oxford St., W.1.
Moseley, H. G., & Co., Ltd., Eddo Works, Hospital St., Birmingham.

Newmectric, Ltd., 108, Victoria St., S.W.1.
New Welbeck, Ltd., 93, Baker St., W.1.
Nobbs, Geo. (1935), Ltd., 87, Cleveland Rd., Euston Rd., W.1.

Orel-Micro, Ltd., 39, Berners St., W.1.
Ormond Engineering Co., Ltd., Ormond House, Rosebery Av., E.C.1.
Ozonair, Ltd, Ozonair House, St. Leonard St., S.W.1.

Partridge, Wilson & Co., Evington Valley Rd., Leicester.
Permatome Co., 57, Moorfields, Liverpool, 2.
Petters, Ltd., Westland Works, Yeovil.
Philips Lamps, Ltd., 145, Charing Cross Rd., W.C.2.
Phillips, A., Ltd., Excelsior Works, Eyre St., Birmingham.
Phœnix Telephone & Electric Works, Ltd., 38, Newman St., Oxford St., W.1.
Pilkington Bros., Ltd, St. Helens, Lancs.
Premier Electric Heaters, Ltd., Keeley St., Birmingham.
Pressed Steel Co., Ltd., Cowley, Oxford.
Pulsometer Engineering Co., Ltd., Nine Elms Iron Works, Reading.

Ransomes, Sims & Jefferies, Ltd., Orwell Works, Ipswich.
Rawlplug Co., Cromwell Rd., S.W.1.
Read, F. W., & Sons, Ltd., 175-9, Gray's Inn Rd., W.C.1.
Reid, G. M., Ltd., 118, Southwark St., S.E.1.
Revo Electric Co., Ltd., Britannia Works, Tipton, Staffs.
Reyrolle, A., & Co., Ltd., Hebburn-on-Tyne.
Rhodes, Brydon & Youatt, Ltd., Waterloo Rd., Stockport.
Rodda, H. W., & Co., 71, Lambton Rd., S.W.20.
Rotapex, Ltd., 65, Mortimer St., W.1.
Rowland's Electrical Accessories, Ltd., 156-9, Hockley Hill, Birmingham, 18.

St. Helens Cable Co., Ltd., Slough.
Salford Electrical Instruments, Ltd., Peel Works, Silk St., Salford, Lancs.
Sanders, Wm., & Co. (Wednesbury), Ltd., Falcon Electrical Works, Wednesbury.
Santon, Ltd., Somerton Works, Newport, Mon.
Savoy Refrigerators, Ltd., Dukes Av., Chiswick, W.4.
Schall & Son, Ltd., 71-75, New Cavendish St., W.1.
Scholes, Geo. H., & Co., Ltd., Wylex Works, Wythenshaw, Cheshire.
Searsint, Ltd., 1, Thames House, Millbank, S.W.1.
Siemens Electric Lamps & Supplies, Ltd., 38, Upper Thames St., E.C.4.
Siemens-Schuckert (Great Britain, Ltd.), 30, New Bridge St., E.C.4.
Simister, Samuel, & Co., Croston St., Bolton.
Simplex Electric Co., Ltd., 159, Great Charles St., Birmingham.
Singer Sewing Machine Co., Ltd., City Rd., E.C.1.
Sloan Electrical Co., Ltd., 54, Fetter Lane, E.C.4.
Smellie, James, Ltd., Oxford St., Dudley.
Smith's English Clocks, Ltd., Cricklewood Works, N.W.2.
Space Heating, Ltd., 46, Park Sq., Leeds, 1.
Sparton Refrigeration Co., 415, Oxford St., W.1.
Sterne L., & Co., Ltd., North Woodside Rd., Glasgow, N.W.
Sterilizair, Ltd., 11, Queen Victoria St., E.W.1.
Sun Electrical Co., Ltd., 118, Charing Cross Rd., W.C.2.
Sunshine Devices, Ltd., 57, Moorfields, Liverpool, 2.
Sun-Vic Controls, Ltd., 430-431, Bush House, Aldwych, W.C.2.
Supremus Specialities, Ltd., 118, High St., Erdington, Birmingham.
Synchronome Co., Ltd., 19, Caxton House, S.W.1.

Tabard, Ltd., 16, Station Approach, Clapham Junction.
Teesmade, Ltd., 11A, Cambridge Yard, Cambridge Rd., W.7.
Tellus Super Vacuum Cleaner, Ltd., 68, Victoria St., S.W.1.
Thermal Syndicate, Ltd., Neptune Bank, Wallsend-on-Tyne.
Thermega, Ltd., 51, Victoria St., S.W.1.
Thermidair, Bush House, W.C.2.
Thermovent, Ltd., 1039, Argyle St., Glasgow.
Thomas, Fredk., & Co., Ltd., 189, Drummond St., Hamstead Rd., N.W.1.
T.M.C.-Harwell (Sales), Ltd., 233, Shaftesbury Av., W.C.2.
Tricity Cookers, Ltd., Wellington House, Strand, W.C.2.
Troughton & Young, Ltd., 143, Knightsbridge, London, S.W.1.
Tucker, J. H., & Co., Ltd., King's Rd., Tyseley, Birmingham.

Union Cable Co., Ltd., Dagenham Dock, Essex.
Unity Heating, Ltd., Broadwater Rd., Welwyn Garden City, Herts.
Universal Boilers & Engineering Co., Ltd., Oxford Mill, Burnley.
Universal Refrigerators, Ltd., 201-211, Bishopsgate, E.C.2.
Utilities, Ltd., 1, Newman St., London, W.1.

Vactric, Ltd., Waterloo Rd., Cricklewood, N.W.2.
Veritys, Ltd., Aston, Birmingham.
Vidor, Ltd., West St., Erith.

Walker, Hunter & Co., Ltd., Portdownie Ironworks, Falkirk.
Walsall Conduits, Ltd., Excelsior Works, West Bromwich.
Ward & Goldstone, Ltd., Frederick Rd., Pendleton, Salford, 6, Lancs.
Washbury Cpn., 237, Oxford St., W.1.
Westinghouse Brake & Signal Co., Ltd., 82, York Rd., N.1.
Westinghouse Electric International Co., 2, Norfolk St., Strand, W.C.2.
White, W. R., 22, Bruton St., Berkeley Sq., W.1.
Winsor Axia Fans, Ltd., 9, Victoria St., S.W.1.
Wo-Bar Manufacturing Co., Ltd., 69a, Shakespeare St., Southport.

Zeros (Sales), Ltd., Dagenham.
Zerozone, Ltd., 14, Regent St., S.W.1.

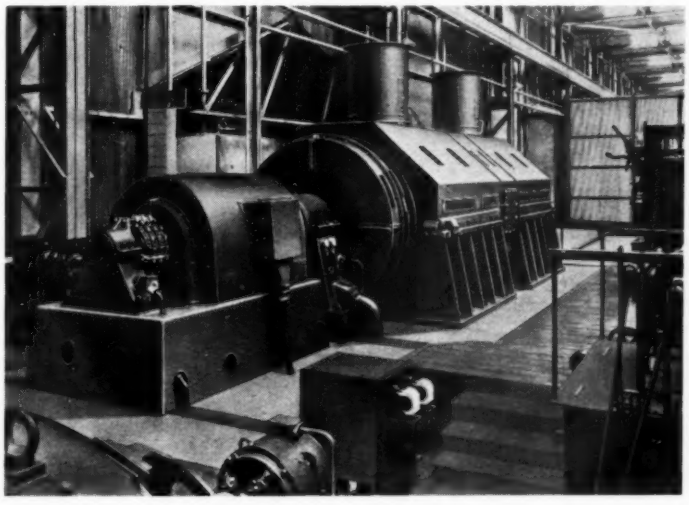
Modern Switchgear Testing

DURING the past week we have had an opportunity of witnessing demonstrations of circuit-breakers passing under short-circuit at the plant of Switchgear Testing Co., Ltd., at Old Trafford, Manchester. This company owns and operates the equipment on behalf of the British Thomson-Houston Co., Ltd., Ferguson, Pailin, Ltd., and the Metropolitan-Vickers Electrical Co., Ltd.

Short-circuit power is supplied by a two-pole, 3,000-r.p.m. three-phase alternator driven by a 1,200-h.p. slip-ring motor. At full excitation, a three-phase initial output of 2,500,000 kVA asymmetrical and 1,800,000 kVA symmetrical is obtainable at either 12.7 kV or 7.33 kV by interchanging external links. The frame of the stator is free to oscillate on steel spring supports. Excitation is from a 75-kW motor-generator, and carries for a short time the 5,000 A induced in the main field on maximum short circuit, but a super exciter is being installed to boost the field immediately prior to a short circuit so as to maintain the flux in the generator.

A 12,000-A (1.5 million-kVA) master circuit-breaker interrupts, at a pre-determined time interval, the supply to the switch under test should the latter fail. Closure of the test circuit is effected by a switch capable of dealing with peak currents up to 420,000 A.

Two sectionalised air-core reactors per phase limit the test-current value; one of these is a six-section cast-in-concrete unit, and the other a two-section dry-coil stack unit, both sets with links for series or parallel connections. There are also two banks of resistors in series with each phase of the test circuit; the heavier for controlling the decrement of the d.c. component of short-circuit current at from 0.05 to 0.3 p.f., and the lighter for power-factor control at low current values when testing switches under normal load-breaking conditions up to 0.8 p.f. only.



The test generator at Old Trafford

The test cells

Voltage ranges of from 0.55 to 132 kV three-phase and from 0.317 to 154 kV single-phase are obtainable by transformation. From 22 to 132 kV can be provided in multiples of 11-kV, by a bank of three single-phase star-star transformers having their secondary windings in twelve sections for series and parallel combinations. An initial three-phase output of 1,000,000 kVA asymmetrical and 780,000 kVA symmetrical can be obtained with the primaries and secondaries electrically separate, but by connecting the primary and secondary windings in series the maximum values become 1,540,000 and 1,100,000 kVA can be obtained at 22 and 33 kV. By means of a step-down transformer, also with sectionalised windings, a three-phase initial output of 350,000 kVA (asymmetrical) and 250,000 kVA (symmetrical) can be obtained at 2.2, 1.1 and 0.55 kV.

Two reinforced-concrete open-front cells are available for tests up to 33 kV, and an outdoor area with overhead bus-bars for tests up to 132 kV. Fires are extinguished by sixteen h.p. "Mulsifyre" water sprays fitted to the ceiling of each cell. Between the cells is a selector-link compartment. Tests are observed from concrete dug-outs forty yards from the cells, and from the control house.

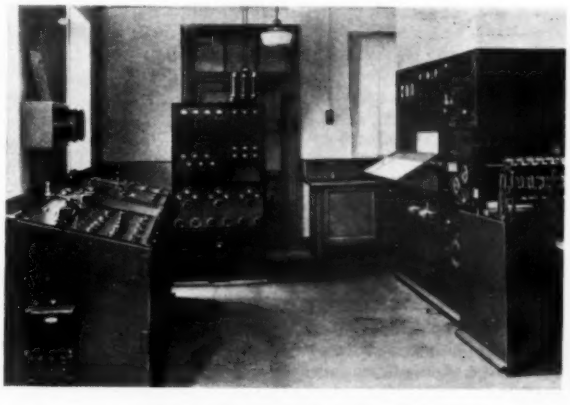
The control house is a two-storey building. On the ground floor are the control, recording and printing equipment and dark rooms, and on the upper floor an observation gallery (with windows of armour glass) and offices.

A master relay co-ordinates the initiation of all testing and recording operations; this relay is a multi-ring revolving drum, each ring of which can be moved through 360 deg. to adjust priority of circuit as well as time intervals. The relay is geared direct to the camera-drum shaft of a sixteen-element electromagnetic oscillograph.

This instrument records sixteen quantities simultaneously on one film up to 36 in. long by 12 in. wide, but an electrically operated shutter permits the exposure of any predetermined shorter lengths. Three circuit interrupting tests can be recorded on the full lengths of film in conjunction with a three-position clutch between the master relay and the camera-drum shaft. After exposure the drum is pushed back into the dark room and reloaded without being removed, a ground glass scale being swung into position for calibrating zero lines which are set to avoid overlapping of the sixteen traces. The vibrator elements are in two rows of eight, each with its arc lamp, and each element has a separate adjustment.

As the frequency of the restriking-voltage transient is too high for recording by the electro-magnetic oscillograph, a cathode-ray oscillograph making three records of the restriking voltage on one film also 36 in. by 12 in. is employed. A continuous record of arcing, re-striking and recovery voltages is thus obtained. One cycle of a 50-cycle symmetrical recovery voltage wave can be drawn out to 36 in. The induction motor driving the film drum at 3,000 r.p.m. is placed inside the evacuated chamber in which the drum rotates.

The deflector plates are served through shielded concentric cables connected to voltage dividers, which are tapped com-



General view of the control room

bined brakings for tests up to 33 kV and tapped voltage-transformer bushings for higher voltages. Further reduction to 500 V is effected in the control house by variable-capacity voltage dividers.

A restriking voltage indicator, situated in the selector compartment between the test cells, records the inherent restriking voltage wave across the circuit-breaker contacts (*i.e.*, the true test circuit conditions unmodified) in the form of a standing picture on the fluorescent screen at the end of a sealed-glass cathode-ray tube.

Fluid pressure developed in a tank can be ascertained by the movement of a diaphragm in the magnetic circuit of the head of an electro-magnetic recorder, which causes an out-of-balance current in a 1,000-cycle bridge circuit that passes through an oscillograph element. An electrostatic recorder is also available in which the diaphragm forms one plate of a condenser and the movement results in an out-of-balance current in a 100,000-cycle bridge circuit.

Demonstrations witnessed by us showed the electromagnetic effect of short-circuit current on the blade of a horizontal isolating switch which was blown open, and the disruptive effect of subjecting an obsolete circuit breaker to a three-phase short-circuit of 100,000 kVA at 11 kV. By a rapid change over of connections a similar test was applied to a modern circuit-breaker (which was run in on a trolley from a siding on rails) but with an operating duty of B-3-MB-3-MB (the new international standard proposed, in which the intervals are to be three minutes).

Buckling of the top plate of the obsolete switch and other damage caused an oil fire, but the modern switch stood the much more severe ordeal without displaying any signs of distress.

The E.P.E.A. Dinner

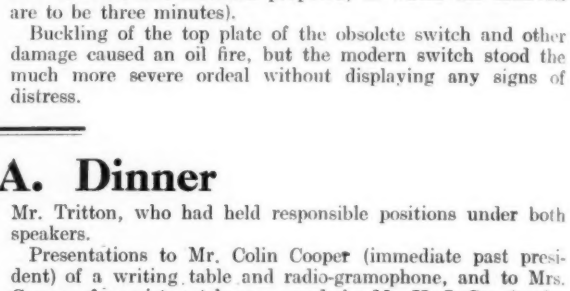
THE number attending the eighteenth annual dinner given by the Southern Division of the Electrical Power Engineers' Association to the National Executive Council exceeded the high-water mark of last year and many late applicants for tickets were disappointed, as the 600 present were as much as the King's Hall, Holborn Restaurant, would accommodate.

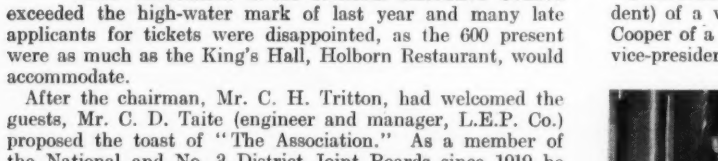
After the chairman, Mr. C. H. Tritton, had welcomed the guests, Mr. C. D. Taite (engineer and manager, L.E.P. Co.) proposed the toast of "The Association." As a member of the National and No. 3 District Joint Boards since 1919 he had always been impressed by the wise leadership shown by the executive committee and chief officials of the E.P.E.A. He believed that the standard of proficiency of its members, which it was one of the objects of the Association to maintain, would be advanced by the training scheme recently adopted. Response was made by Mr. J. F. Sarvent (president, E.P.E.A.), who, referring to the agreement made that no further revision of the salaries schedule should be submitted before the expiration of two years, expressed the hope that attention might then be paid to the allocation of grades to staff positions not now included, especially in view of the development of the sales side of undertakings. The Association had continued to support the Association of Municipal Electrical Engineers in their common interest of banning advertised positions which offered inadequate remuneration.

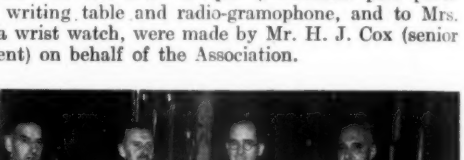
Mr. F. W. Purse (chief engineer, London and Home Counties J.E.A.) expressed the view that no reorganisation of the industry ought to reduce the number of men engaged. Thus, while ninety men were employed at the old Fulham station, 270 were required at the new one, and since the London J.E.A. had taken over five areas, the number of those needed for developing them had nearly trebled.

In responding, Mr. E. E. Hoadley (engineer and manager, Maidstone Corporation Electricity Department) stated that the dropping of the compulsory clauses in the 1919 Act had led to the grid and to the McGowan Report. The C.E.B. had done its job of cheapening generation, but distribution and sales remained as they were. The E.D.A. was now doing great work with Mr. Taite as chairman, and as a result of the impetus given it by his predecessor, Mr. P. J. Robinson. The greatest obstacle was ignorance on the part of the public, but the lay Press had now discovered that electricity was "news." Electricity supply must not, however, be used as a pawn in national or local politics. Mr. Hoadley supported the tribute paid by Mr. Purse to the engineering ability of the chairman, Mr. Tritton, who had held responsible positions under both speakers.

Presentations to Mr. Colin Cooper (immediate past president) of a writing table and radio-gramophone, and to Mrs. Cooper of a wrist watch, were made by Mr. H. J. Cox (senior vice-president) on behalf of the Association.







1. Members of the National Executive Council (left to right):— Back—Messrs. J. G. Willey, H. S. Davidson, H. Roberts and C. M. Cooper. Front—Messrs. E. Laming, A. Harman Jones, P. S. Jolin and R. H. Rawll. 2. Leading members of the Association:—Messrs. H. S. Cox (vice-president), J. F. Sarvent (president), W. C. Kennett, A. H. Perkins (hon. treas., Southern Division), C. H. Tritton (chairman, Southern Division), G. W. Essex (asst. gen. sec.), F. H. Smethurst (hon. sec., Southern Division), and C. Cooper (immediate past-president). 3. Some of the principal guests:—Mr. H. T. Young (president, I.E.E.), Mrs. H. T. Young, Messrs. E. E. Hoadley, C. G. Morley New, J. M. Kennedy, and C. D. Taite

The chairman, in proposing a vote of thanks to the hon. secretary, Southern Division, for arranging the dinner, referred from personal knowledge to the efficient organisation of the function as a sample of Mr. F. H. Smethurst's work in his engineering capacity. The dinner was followed by a dance and reunion until midnight.

Chief Engineers' Salaries

Vacancies for two borough electrical engineers at Aberdeen and Stafford have recently been advertised, and in both cases the salaries offered have been below those specified in the "Walker Scale." Correspondence on the matter has been exchanged between the Corporations concerned and the Standing Joint Committee of the Associated Municipal Electrical Engineers and the Electrical Power Engineers' Association. In the case of Aberdeen it has been pointed out by the Committee that the appropriate commencing salary is £1,200 while the Town Council is offering £900 rising by annual increments of £50 to £1,050. The commencing salary of the Stafford post should, it is claimed, be £1,050, whereas the salary offered is £500 rising to £600. The Committee states, with regard to Stafford, that it realises the difficulty of paying the full appropriate salary to a newcomer and is willing that the commencing salary should be £950 rising to the schedule figure within a reasonable period.

Electricity Supply in the Home Counties

THE Report of the Proceedings of the London and Home Counties Joint Electricity Authority for the year ended March 31st last has now been issued. The Authority owns six distribution undertakings in the districts of Surbiton, Twickenham, Sutton, Dorking, Leatherhead and Weybridge, extending over 122,000 acres and having a total population of 412,000, and 123,000 premises.

These undertakings sent out to feeders 112 million kWh, an increase of 28 per cent. over the previous year, and dealt with an aggregate maximum demand of 42,000 kW, the connected load being 262,000 kW and the number of consumers 103,000, of which over 13,000 were connected during the year. When these undertakings were acquired in 1931 the number of consumers was 37,000 and kWh to feeders was 25 million.

Two-part tariffs have been taken advantage of by more than 60,000 consumers, assisted wiring schemes by 14,000, and hiring schemes for cookers by 15,000, wash-boilers by 2,687, cooker heaters by 1,882, irons by 1,868, and kettles by 4,920. These in all cases represent considerable advances on the previous year, cookers by 50 per cent. and wash-boilers and water-heaters by upwards of 80 per cent., while the number of street lamps connected increased by 800 to 9,728. A scheme has been introduced for three-years' hire-purchase of refrigerators.

Tests made in December, 1935, in certain residential districts showed that 1,713 consumers with an average connected load of 3.7 kW made a m.d. of 0.49 kW per consumer, but only 0.34 kW on the system peak, giving a ratio of system peak load to connected load of one to eleven.

Extensions by overhead lines into the rural areas south of Dorking have resulted in applications by 1,690 consumers (537 assisted wiring); 605 required cookers, 34 wash-boilers and 49 water-heaters, and 333 h.p. of motors was applied for.

Two-part tariffs for all purposes include secondary charges in the summer of ½d. and ¾d. for the inner and outer zones, and in the winter of ¾d. and 1d. Fixed annual charges for all domestic consumers range from £2 for up to 800 sq. ft. to £3 10s. 6d. between 1,401 and 1,500 sq ft., above which an addition of 3s. 6d. is made per 100 sq. ft. (or part). For business premises the fixed amount is £1 per 100-W installed and for power a charge varying with the installed capacity between £2 16s. per h.p. up to 5 h.p. and £1 12s. per h.p. over 80 h.p., intermediate sizes being assessed at proportionate rates.

On the St. Helier Estate of the L.C.C. mains and services were laid free of charge and the consumers formerly paid 1s. weekly (collected with the rent) and 1d. per kWh. The standard domestic tariff has now been substituted plus 1d. per week per consumer for the cost of service, this representing a reduction to the 5,078 consumers of £2,500 per annum. During the year the twelve canvassers obtained an additional revenue of £17,264.

Eighteen generating stations are operated by the J.E.A. (by arrangement with the authorised undertakings) for supplying the electricity required by their owners for distribution, in addition to bulk supplies from the Central Electricity Board. The aggregate kWh supplied in 1935 was 394 million—an increase of 22.4 per cent. over the figure for 1934. The biggest of these were Hammersmith (64 million), Islington and Wimbledon (51 million each).

Particulars are given of the clerical staff salaries, grading and superannuation schemes of the Authority, of generating-station and transmission-line extensions, and of alterations of systems and voltages that have been approved.

Capital expenditure at March 31st stood at £4,478,000—an increase of £488,000 (spent almost entirely on local distribution) during the twelve months. The allocation of the total expenditure is:—Administration, £15,000; bulk-supply transmission, £71,000; supply in local distribution areas, £4,392,000. Loans appropriated to capital expenditure amounted to £4,392,000, of which £516,000 had been repaid at the end of the year under review.

Revenue expenditure in local distributing areas during the year aggregated £784,000, of which nearly £1,000 was incurred in generation, £257,000 on the purchase of electricity, £77,000 on distribution, £14,000 on public lighting, £138,000 on administration, rents and rates and capital charged to revenue, leaving a balance of £297,000 to be transferred to net revenue account.

Income from distribution of electricity amounted to £728,000 and for meter rents, profits on showroom sales and sundry receipts to £56,000. About 44 per cent. of the revenue from the first was provided by domestic two-part tariff consumers and 14 per cent. from power. After meeting loan charges and other interest and sundry charges there was an excess of expenditure over income of £15,000 on net revenue account.

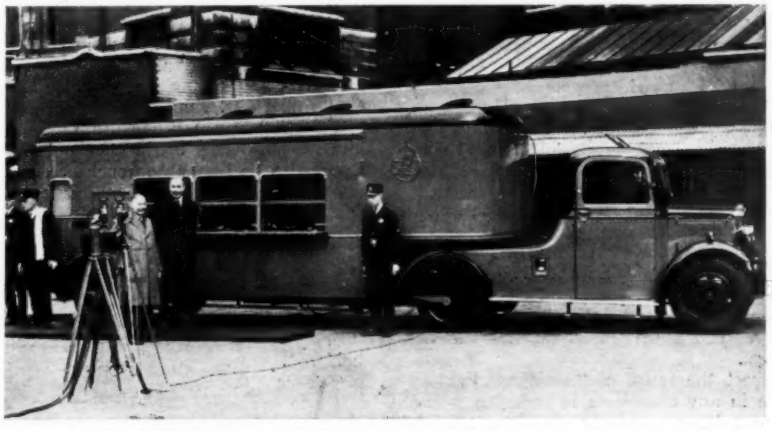
The Mobile Post Office

THE first travelling post office, provided for the convenience of the public at outdoor events not within easy reach of an ordinary office, was inaugurated by the Postmaster-General last week.

The equipment has been built into a specially constructed trailer, which is hauled by a motor tractor. It can be used wherever a tapping point, by means of a trailing cable, is available on the telegraph and telephone distribution system.

Through a door at the rear access is obtained to two telephone cubicles, from which local and trunk calls can be made to any part of the country. They are sound-proof and equipped for manual, automatic or magneto working, with roof lamps and ventilators and a "Vent-Axia" exhaust fan over each folding door.

In the central "office" compartment is another telephone for staff use and a teleprinter with an auxiliary unit for enabling the instrument to be worked under different circuit conditions for transmitting and receiving telegrams from all parts of the world. The door is on the near side, while on the off side there are a letter box, two stamp-selling machines, and three "service" windows, with a detachable outside writing ledge and removable awning above.



The mobile post office at St. Martin's-le-Grand prior to leaving for service

The interior equipment of the vehicle includes among other things a folding wash basin fed from a water tank above; also plug points for an electric kettle and counter lamps, which are additional to the fixed body pillar lights and eight roof lights.

The forward portion of the vehicle is closed by a roller shutter, so forming a stores compartment and also accommodation for a battery which provides all the electricity needed on the vehicle. It was made by the D.P. Battery Co., Ltd., and is of 30-Ah capacity, traction type, arranged in two 110-V sections on draw-out racks. Sealed ebonite containers are used, assembled in three hardwood crates each containing eighteen cells. The iron-clad charging panel was supplied by the Power Equipment Co., Ltd.

The battery is charged by an E.C.C. dynamo installed under the seat in the tractor cab and controlled by a lever in the floor. It is driven through auxiliary gearing from the main tractor gear box. Although normally the generator will be used while the vehicle is stationary, it is possible to charge the battery while travelling. The machine is of a light-weight, enclosed, ventilated shunt-compound type, producing 15 A at 98-150 V, and it runs at 1,500 r.p.m., the normal charging rate being 3A.

Connection between the generator and the charging panel is effected by a multi-core tough-rubber cable and water-tight plug and socket between the tractor and trailer. Included in this cable is a pair of wires for the tail light of the vehicle, current for which is supplied by the tractor's lighting dynamo.

M

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

Fire Hazards

The question of fire hazard in electrical installations is receiving increasing attention both in the technical Press and on the part of individuals. There is a diversity of opinion with regard to the measures to be adopted and results to be expected. The Council of the British Electrical and Allied Industries Research Association has set up a representative committee of all the interests concerned to investigate and to report upon the fire risks associated with electrical plant, and to determine the limitations and useful fields and methods of application of the various fire-extinguishing media and questions of design involved.

Certain data have been collected and tests will be carried out. The committee would be pleased to receive from station engineers and others any information they may care to offer based on actual recent experience in dealing with fires that have occurred or on problems that have arisen in this connection and methods or procedure they may have devised.

15, Savoy Street, W.C.2. E. B. WEDMORE.
September 30th. *Director and Secretary,*
British Electrical and Allied Industries Research Association.

Diversity Factor and Tariffs

Many articles on diversity factor have appeared in the technical Press during the last few months. Although several of these have been written with the object of assessing the value of the diversity factor, they indicate that among engineers a certain amount of obscurity exists as to the exact function of diversity in relation to the financial side of electricity supply. Much of this obscurity is probably due to an endeavour to connect diversity factor with the selling price rather than the cost of supply.

The cost of supply can be readily divided into its components of fixed and running charges, the ratio of the two items in terms of the unit charge being of the order of 8 or 10 to 1.

Since the diversity factor controls the cost of supplying the individual maximum demands and, therefore, is directly related to the fixed portion of the costs only, the direct effect of the diversity factor on the tariff charge is obscured unless the tariff is a two-part one with fixed and running charges possessing the same ratio as that of the cost.

In most cases it is neither essential nor desirable to use the same ratio for the selling price, because it is possible to adjust the ratio between the fixed and the running charge to any desired value without directly affecting the revenue, and such adjustments provide an effective method of encouraging the development and controlling the use of electricity supply.

Therefore, if the effect of diversity factor on tariff charges is stated without defining the changes in ratio which occur between the assessment of supply costs and the final tariff figures, it becomes impossible to either analyse or comprehend the statement. Similar difficulty arises when two or three stages are omitted from the development of a mathematical proof.

These difficulties are realised by tariff experts, but engineers not quite so familiar with financial juggling may easily be confused when attempts to connect diversity factor directly with tariff charges impart to a comparatively straightforward subject an abstruseness which it need not possess.

Leeds, *October 5th.* H. HURWORTH.

The Problem of Design

I should like to congratulate your correspondent Mr. Mills on his letter in your issue of September 25th. The straining after "artistic" design, quite apart from and frequently at the expense of utility or fitness for purpose, is all too common throughout the industry. This is particularly apparent in the design of lighting fittings.

One has only to inspect the range of "artistic" lighting fittings offered for sale in any showroom in order to realise that most of them are neither genuinely artistic nor practically efficient. It is commonly accepted among genuine artists that in all forms of applied art fitness for purpose is the safest passport to æsthetic quality, and that if an article is well designed so as to fulfil its function as simply and efficiently as possible it is practically certain to be artistically satisfying.

Lighting fittings should therefore be designed, first and foremost, to give efficient lighting, and for any particular lighting scheme it is essential to consider the architectural and decorative features of the room both as to their practical influence on the distribution and quality of the light and from the point of view of artistic unity.

Unfortunately the common practice nowadays is just the opposite of this; fittings are first designed to be "artistic" or "period," regardless of practical considerations, and then bulbs and tubes are added to "light them up" regardless of the wattage that may have to be used, the result being generally both inartistic and inefficient.

London, W.C.2, *September 30th.* G. V. DOWNER.

Mr. Mills's sweeping condemnation of present-day domestic-appliance design is a trifle disheartening to a mere designer of electric fires.

Looking at the tremendous variety of fires illustrated in this journal, it would seem impossible that none should receive his approval.

September 30th. DESIGNER.

"Banned" Positions

Yet another undertaking has been added to the melancholy list of those offering salaries below the scale of the A.M.E.E., and it is equally certain that in this case, as in all the previous ones, an appointment will be made no matter whether the post is "banned" or not by the Joint Committee of the A.M.E.E. and E.P.E.A.

There appear to be three principal classes of councils which advertise positions in electricity undertakings at low salaries: (i) Cities or towns suffering from industrial depression. (ii) Cities or towns where the scale salary for the chief electrical engineer is higher than that enjoyed by other principal officers. (iii) Councils who consider that with the introduction of bulk supply and the closing down of the power station the need for a highly qualified chief engineer has disappeared.

With regard to (i) it is to be hoped that with the industrial recovery now being experienced, such undertakings will augment the salaries of the engineers concerned. Nothing can be done with regard to (ii), and the industry must appreciate the viewpoint of the town councils in this respect. The ignorance which gives rise to the third class mentioned is capable of being dispelled, and possibly the Commissioners could be of assistance in this matter.

The applicants for "banned" positions are drawn principally from three classes: (i) Ambitious juniors who see a solid wall of seniors blocking their way to the "Chief's" chair. (ii) Deputies who see, with advancing years, the chance of assuming the dignity of "chief engineer" passing. (iii) Engineers who are unhappy in their present posts, and whose security may be in jeopardy. If such are the fields from which applications are drawn, it is for the councils concerned to determine whether or no their requirements are likely to be fully met.

The engineer on the other hand should, in his own interests, give full weight to other considerations which are involved in his acceptance and, in fact, even in the application for a banned post. Among these considerations are the following: (i) A person is valued at the price he himself places upon his services. (ii) His new council is likely to regard him as a "cheap" man and value him accordingly. (iii) The Labour members of the new council may regard him as a "blackleg." (iv) His technical staff, most of whom will be members of the E.P.E.A., may likewise regard him, and fail to respect him. (v) Amongst his brother "chiefs" he may be similarly regarded, and he may on such occasions when the profession meet socially and at conferences be conscious of the "cold shoulder."

The above considerations are purely selfish. Other factors, such as the desirability of maintaining a proper salary level in the interests of all employed in the industry, and maintaining a high level of qualifications for those accepting senior posts in the profession should also influence an intending applicant.

I am not a member of the Associations referred to and do not hold a "banned" appointment. PECCAVI.

October 2nd.

A False Prophet

The other day I happened to go through some old technical books belonging to my grandfather and I found the following amusing item in "Calvert's Mechanics' Almanack," 1874 to 1879, the note coming from the *Echo* of April 12th, 1877:—

"Electricity as a motive power.

"——a man who seeks to utilise electricity as a motive power, though not a seeker after perpetual motion, places himself in the same category as those deluded inventors; for nothing has been more satisfactorily exploded than the notion that, with cheap coal, electricity could possibly compete with steam." GEORGE BUCKLEY.

Kingswinford, Dudley, *September 28th.*

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

The Radio Retailers' Association

We are informed by N.E.C.T.A., Ltd , (an allied body of the Electrical Contractors' Association) that the National Association of Radio Retailers, Ltd., has now been formally registered. Its memorandum is a comprehensive one, but the articles of association have been drafted in such a way as to facilitate alteration, amendment and amplification. It is stressed that the new Association will be run by the radio retailers themselves, but to avoid possible delay a provisional Council of six has been formed to carry on until there are sufficient members to decide upon the most efficient way of protecting their interests. The N.E.C.T.A. stresses that in promoting the N.A.R.R. it aims at providing genuine radio retailers with a service equivalent to that which N.E.C.T.A. affords its own members. This service comprises negotiation with associations representing the manufacturing side of the electrical industry, the taking up of legal and labour problems, and generally safeguarding members' business interests. Membership of the new body is open to all genuinely engaged in the radio retail business, and full information can be obtained from Mr. L. C. Penwill, director and secretary of the E.C.A. and allied associations, 23, Bedford Square, London, W.C.1.

Oxford Electrical Exhibition

During the past nine days the Town Hall at Oxford has been the scene of an attractive and comprehensive exhibition of up-to-date electrical equipment. It is the first to be held since the city's electricity supply undertaking was taken over by the Corporation in 1932, and is a joint enterprise of the City Electricity Supply Department, the Oxford Electric Co., Ltd., the Wessex Electricity Co., the Abingdon Electric Supply Co., Ltd., and local electrical contractors, in conjunction with the British Electrical Development Association. In performing the opening ceremony on September 30th the Duke of Marlborough said that he was glad to have an opportunity of seeing what the progress of modern engineering and science had done. His home at Blenheim, he said, was the first country house in England to have electricity installed. After explaining the objects of the exhibition, the Mayor, Councillor Mrs. M. G. Townsend, mentioned that new electricity showrooms are to be opened shortly in George Street. Thanking the Duke for being present, Councillor E. W. Gill, chairman of the Electricity Committee, declared that the time was quite near when an all-electric house would be available for every family in the country. Lord Meston (chairman of the Wessex Electricity Co.) congratulated the Mayor on being responsible for the present cordial relations between the various supply undertakings in the district. A special feature of the exhibition was an amusing sketch entitled "Cookery Nook," presented by the Jackson Stove Co., Ltd. The first scene was an old-fashioned kitchen with a coal oven where a woman was shown struggling with her cooking. A fall of soot caused a state of upheaval which brought the husband to his senses. The scene then changed to a thoroughly modern electric kitchen which provided the occasion for a half-hour's cooking demonstration. Performances were also

The Duke of Marlborough opening the electrical exhibition at Oxford Town Hall

given of the E.D.A. talking films, other special attractions being "Mr. George Robot," a cake baking competition, and ballots for placing the advantages of electricity in order of merit, also a series of posters. In conjunction with the Electricity Supply Department the British Thomson-Houston Co., Ltd., was responsible for the decorative lighting of the exhibition hall, the vestibule and main staircase being artistically illuminated by means of "Mazda" light tubes in various colours. Several manufacturers combined to produce special meter and poultry and gardening sections, and among those who had separate exhibits were:—Belling & Co., Ltd.; Berry's Electric, Ltd.; British Thomson-Houston Co., Ltd.; Burnley Components, Ltd.; Drake & Gorham Wholesale, Ltd.; English Electric Co., Ltd.; Ferranti, Ltd.; General Electric Co., Ltd.; H.M.V. Household Appliances, Ltd.; Harcourts, Ltd.; L. G. Hawkins & Co., Ltd.; Heatrae, Ltd.; Hotpoint Electric Appliance Co., Ltd.; J. P. Tubular Heater Co., Ltd.; Jackson Electric Stove Co., Ltd.; Lightfoot Refrigeration Co., Ltd.; Moffats, Ltd.; Ozonair, Ltd.; Premier Electric Heaters, Ltd.; Revo Electric Co., Ltd.; A. Reyrolle & Co., Ltd.; Simplex Electric Co., Ltd., and S. Wolf & Co., Ltd.

The New Exeter Showrooms

In 1928 the Exeter City Electricity Department secured premises in Sidwell Street, Exeter, which were adapted as showrooms and stores to cope with the development of the domestic and commercial applications of electricity, but these soon

The new showroom of the Exeter City Electricity Department, at the rear of which can be seen the demonstration theatre

became inadequate, and larger premises were acquired in Dix's Field, where extensive structural alterations have been made to adapt them to the needs of the electricity undertaking. These new offices and showrooms, which were to be opened on Wednesday last by Sir John R. Brooke, vice-chairman of the Electricity Commissioners, are "T" shaped, with the main frontage to Fore Street, a side frontage to South Street, and an entrance from George Street. They consist of a basement and four floors with an area of approximately 20,300 superficial feet. The basement is used for stores, and there are also a strong room and a sub-station. The Fore Street frontage has two display windows, immediately behind which is the showroom, which occupies the whole width of the premises. On one side of this is the Accounts Department, and on the other are arranged a counter for inquiries, a model kitchen and a bathroom. At the rear of the showroom is a demonstration theatre with seating accommodation for sixty-four people. Behind the theatre are the consumers' engineer's and the chief storekeeper's offices. The first floor has two waiting rooms, offices and stores, while the second and third floors have been converted into living accommodation for the mains foreman. Features of the showroom are illuminated glass insets in the panelling and an indirect system of lighting. Generally, the offices are electrically heated on the tubular system with provision at certain points for radiators. The showroom is warmed by specially designed concealed electric heaters. The whole of the work has been carried out under the supervision of Mr. A. L. Keet, the city electrical engineer.

Better Light—Better Sight

Representatives of many electricity undertakings in South-West Lancashire and North Wales attended the conference held under E.D.A. auspices at the Grand Hotel, Manchester, on September 29th to discuss the E.D.A.-E.L.M.A. National Lighting Campaign. Mr. A. T. Annett (chairman of the North-West England area of E.D.A.) presided, the principal addresses being given by Mr. V. W. Dale (E.D.A.) and Mr. W. J. Jones (E.L.M.A.), both of whom outlined the nature of the scheme of co-operation between the opticians and the electric lighting interests. Ald. Winterbottom (Nelson) expressed regret that a more concentrated attempt was not made to secure a better standard of lighting in factories, especially cotton mills. The support of the opticians did not go far

enough; it would have been more effective to have secured the co-operation of the medical officers of health. Mr. W. J. Jones said it was most difficult to get a professional body to co-operate with a trading body like E.L.M.A. Mr. R. C. Hawkins announced that he was arranging conferences between opticians and the electrical interests in eight or nine towns in the area.

Exhibition of Inventions

A machine for synchronising smells with a cinematograph film, and a device which apparently switches radio sets and

The demonstration room and an exterior view of the Welwyn Garden City Electricity Supply Co.'s new showrooms

other apparatus on and off by an individual's concentrated gaze on to what is called a "Psycho Eye" attached to the "Telekinescope," are two of this year's electrical contributions to the International Exhibition of Inventions (organised by the Institute of Patentees), now being held at the Central Hall, Westminster. Metal filament and anti-dazzle lamps, automatic indicating apparatus, an automatic shockproof fusebox, hand torches, a connector using springs instead of plungers, a method of reeling live electrical conductors, dishwashing machine, water heater, power-driven shears, route indicators, a radiator which incorporates an ornamental panel or fire-irons when not in use, and a number of ingenious radio instruments, are among other interesting items. In the trade section those exhibiting include the Tellus Super Vacuum Cleaner, Ltd.; W. T. Driver (trouser pressers and arc welders); Fortiphone, Ltd. (appliances for the deaf); W. C. Davey & Co. ("Sterdy" telephones, luminous signalling systems, and electrical release locks), and Ideal Home Electrical Appliances, Ltd. The exhibition closes to-morrow (Saturday).

For Sale

Messrs. Goddard & Smith will sell by auction on October 21st at 13, High Holborn, the stock of an electrical factor.

Hull Corporation Electricity Department has for sale a 10,000-kW turbo-alternator.

(See our classified advertisements.)

New B.T.H. Premises

The British Thomson-Houston Co., Ltd., has purchased from the Singer Co., Ltd., factory premises in Read Street, Coventry, for further developments in the near future. This factory has a floor-space area of 93,000 sq. ft.

Orders Recently Booked

Messrs. C. A. Parsons & Co., Ltd., have received the order for two turbo-generators of 18,750 kW capacity at 1,500 r.p.m. for the Broken Hill Proprietary Iron & Steel Works, in New South Wales, Australia. The turbines will be of the single cylinder reaction type, taking steam at 375 lb. per sq. in. and 750 deg. F. and the alternators will generate at 6,600 V, 25 cycles.

Works Visit

On September 22nd members of the Electricity Committee of the Abertillery Urban District Council visited the Edison Swan Cable Works at Lydbrook, Gloucestershire. They were met at Monmouth by Mr. Kelly, director, and Mr. Morris, London sales manager, together with Messrs. Elliott and Harvey, of Cardiff, and a number of the works staff. Luncheon was taken at the Beaufort Hotel, and afterwards the party proceeded to the works. This visit was undertaken to see the h.v. and l.v. cables which were being made to the order of Messrs. John Collier & Co., electrical engineers, Manchester, who are the contractors carrying out the change-over scheme which the Abertillery Council is now undertaking in part of its area.

Newcastle Electrical Workers' Wages

The Newcastle-upon-Tyne City Council is being recommended by the Transport and Electricity Committee to grant a wage increase of 5s. weekly to the engineering staff in the Transport and Electricity Department. These men were not included in the recent wages award secured by the Amalgamated Engineering Union.

Electrical Progress at Welwyn

An inspection of the Welwyn Garden City Electricity Supply Co.'s new offices and showrooms took place on October 2nd, when Mr. A. T. Bullen, engineer and manager, conducted a party of visitors over the new premises on the ground floor of No. 40, Howardsgate. The frontage has two display windows showing various electrical apparatus and a large "Royal Ediswan Edisign" lamp sign over the entrance advertising "Electricity." The interior consists of a main showroom with a demonstration theatre behind. The showroom is tastefully decorated and in addition to electric fires and lamp fittings there are showcases containing smaller appliances. The demonstration room is used for lectures, this being the first time that public demonstrations on a large scale have been undertaken by the company. The upper floor of the building has been constructed as an all-electric flat. The first supply to Welwyn was switched on in 1921 by Sir Theodore Chambers, chairman of the company, when the population of the district was very small. In September this year the number of consumers reached 3,221; of these 3,044 were domestic consumers, 1,564 using electric cookers. The inspection was followed by a luncheon at the Cherry Tree Restaurant. Mr. J. M. Kennedy (Electricity Commission) proposed the toast of the Company, and in reply Sir Theodore Chambers said that the domestic consumption of electricity could be multiplied ten times if it was used to the fullest extent justified by economic facts. Mr. Bullen proposed the health of the guests and Capt. J. M. Donaldson, chief engineer of the North Metropolitan Electric Power Supply Co., responded.

The Sunderland Electrical Exhibition

An electrical exhibition, organised by the Sunderland Corporation Electricity Department with the assistance of E.D.A.,

A general view of the electrical exhibition now in progress at Sunderland

was opened on Saturday last at the New Rink, Holmeside, Sunderland, by Sir John R. Brooke. Ald. Johnston, chairman of the Electricity Committee, presided and Sir John Brooke,

in declaring the exhibition open, read a message from Sir John Snell, chairman of the Electricity Commission, congratulating the Electricity Committee and Mr. W. A. Royle,

The Perth Premises (W.A.) of the General Electric Co., Ltd.

borough electrical engineer, on their enterprise. The exhibition is the largest of its kind held in the borough and it is interesting to note that the first electrical exhibition was held in 1906 when Sir John Snell was electrical engineer and general manager of the electricity undertaking. The exhibition is illustrative of the many domestic uses of electricity and there are more than thirty display stands representative of a wide variety of interests in the electricity supply industry. Special domestic and commercial cooking and other demonstrations have been given daily, during the current week, and a cake-baking competition, open to all consumers has been held. The exhibition closes to-morrow (Saturday).

Social Events

The G.E.C. Dramatic Society, whose performance of "The Last of Mrs. Cheyney" at the Fortune Theatre in October last resulted in a substantial donation to the charities of the Electrical Trades Commercial Travellers' Association, will present "Autumn Crocus," by C. L. Anthony, at the Fortune Theatre on October 26th and 27th at 8 p.m. The entire proceeds, after payment of expenses, will again be given to the above-mentioned charities. Tickets can now be obtained from Miss Burroughs, Magnet House, Kingsway, W.C.2, or at the box office, Fortune Theatre.

Trade Announcements

Messrs. Pickerings, Ltd., have removed to 116, Victoria Street, Westminster, S.W.1 (telephone: Victoria 9860).

The Sloan Electrical Co., Ltd., has opened a branch at 1, Plymouth Street, Cardiff, under the management of Mr. G. Wilkins, where stocks will be carried.

The registered office of Messrs. R. A. Poole (London), Ltd., is now 6, Warwick Row, Coventry

Messrs. Davies, Kent & Stewart, Ltd., have removed to 12, Emerald Street, Theobald's Road, W.C.1 (telephone: Holborn 6391).

Messrs. Moores (M/c), Ltd., have commenced business at Mayfield Works, Wyre Street Fairfield Street, Manchester, as specialists in insulating materials and all electrical accessories.

Messrs. Veritys, Ltd., have appointed Mr. D. R. S. Martin as their representative for Northern Ireland with offices at 38, Bedford Street, Belfast.

Messrs. A. P. Lundberg & Sons, Ltd., inform us that Messrs. Simpson, Baker & Co., Ltd., of 2-5, Nelson Street, Bristol, and the East London Rubber Co., Ltd., of 29-33, Gt. Eastern Street, E.C.2, no longer represent them as selling agents for their "London" and "London Junior" switches and "Union" adaptor, but will continue to act as stockists of the company's goods.

The German Electric Cable Industry

The Rheydt Kabelwerke Gesellschaft, of Rheydt, Westphalia, has recently acquired the controlling interest in the undertaking of the Deutsche Kabelwerke Gesellschaft, of Berlin.

Advertisement Correction

Since Messrs. Pelling & Co.'s advertisement on page xiv went to press we have been asked to state that the right-hand fire is incorrectly referred to as the "Grosvenor" instead of the "Dorchester," the price of which is from £4 5s. and not £5 15s.

Price Increase

Messrs. Ward & Goldstone, Ltd., inform us that in consequence of the maintained advances in raw materials, notably rubber and copper, the discounts on their radio and accessories catalogue have been revised and there has been an increase in the prices in their list of wires and cables.

The G.E.C. Perth (W.A.) Branch

The Perth Branch of the General Electric Co., Ltd., in Australia, has recently acquired new premises at 393, Murray Street, Perth. As the accompanying illustration shows, the new premises have an attractive frontage, and the large windows enable the company to present a well-arranged display of some of its many appliances.

Stretford Electrical Trades Exhibition

An electrical exhibition is being held under the auspices of the Stretford and district electrical contractors who have secured the co-operation of the Stretford and District Electricity Board and a number of manufacturers. The exhibitors are:—The General Electric Co., Ltd.; Simplex Electric Co., Ltd.; Premier Electric Heaters, Ltd.; Falkirk Iron Co.; Ferranti, Ltd.; the Wardle Engineering Co., Ltd.; Siemens Electric Lamps and Supplies, Ltd.; Falk, Stadelmann & Co., Ltd.; and Hoover, Ltd. The exhibition was opened by Alderman Sir Thomas Robinson on Monday last. Representatives of the exhibiting firms, electrical contractors, and the Stretford and District Electricity Board attended the inaugural luncheon held at the Longford Hall. Proposing a toast to the success of the exhibition, Mr. G. H. Abrahams stated that that was the first of its kind held in Stretford. Sir Thomas Robinson remarked on the fact that so far as electricity in the home was concerned, electrical traders had had things very much in their own hands and had carried on the assisted wiring scheme very well. In other respects—in regard to the installation of cookers, radiators, refrigerators, water heaters, and so on—progress had been slow. Other speakers were Mr. R. Blackburn (chairman of the organising committee) and the Mayor of Stretford. The contractors who accepted the responsibility for the exhibition were:—Messrs. Blackburn & Murgatroyd; Burke & Co., Ltd.; Dome Electric Co.; Fillingham and Thompson; Hullard Electrical Co.; Pickthall & Vickers; J. T. Shawcross; D. L. Topps, Ltd.; and Urmston Electrical Company.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price. October 7th.	Fortnight's Inc. or Dec.
[a] Acid, Oxalic ... ... per cwt.	50s.	—
[a] Ammoniac, Sal ... ... per ton	£36	—
[a] Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
[a] Borax ... ... ,,	£17	—
[a] Copper, Sulphate ... ... ,,	£15 10s.	—
[a] Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
[a] ,, Perchlorate ... ... ,,	6d.	—
[a] Shellac ... ... per cwt.	£4 18s.	—
[a] Sulphur Commercial ... ... per ton	£11	—
[a] ,, Roll ... ... ,,	£11	—
[a] Soda Chlorate ... ... per lb.	3½d. to 3¾d.	—
[a] ,, Crystals ... ... per ton	£5 to £5 5s.	—
[a] Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS ETC.		
[b] Aluminium, Ingots ... ... per ton	£100 to £105	—
[b] ,, Wire ... ... per lb.	1/1 to 1/9	—
[b] ,, Sheet and Foil ... ... ,,	1/3 to 2/9	—
[c] Babbitts Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£187	£3 inc.
Grade II... ... ... ,,	£130	£2 inc.
Grade III ... ... ,,	£70	£1 inc.
[c] Brass (rolled metal 2" to 12" basis) per lb.	7¾d.	—
[c] ,, Tubes (solid drawn) ... ... ,,	10d. to 10½d.	—
[c] ,, Wire, basis ... ... ,,	8d.	—
[c] Copper Tubes (solid-drawn)... ... ,,	11d.	—
[d] ,, Bars (best selected)... ... per ton	£72	—
[d] ,, Sheet... ... ... ,,		
[d] ,, Rod ... ... ,,		
[d] ,, (Electrolytic) Bars ... ... ,,	£44 10s.	£1 inc.
[d] ,, ,, Wire Rods ... ,,	£49	—
[d] ,, ,, H.C. Wire ... per lb.	7¾d.	¼d. inc.
[f] Ebonite Rod ... ... ,,	1/6 to 2/- plus	—
[f] ,, Sheet ... ... ,,	1/3 to 1/6 10%	—
[a] German Silver Wire ... ... ,,	2/5	—
[h] Gutta-percha, fine ... ... ,,	nom.	—
[h] India-rubber, Para-fine ... ... ,,	10½d.	—
[i] Iron, Pig (Cleveland, No. 3) ... per ton	67/6	—
[i] ,, Wire galv. No. 1, P.O. Qual.... ,,	£20	—
[g] Lead, English Pig ... ... ,,	£20 5s.	5s. dec.
[g] Mercury ... ... per bot.	£13 5s.	8s. to 18s inc.
[e] Mica (in original cases) small ... per lb.	9d. to 1/6	—
[e] ,, ,, ,, medium ... ,,	5/- to 10/-	—
[e] ,, ,, ,, large ... ,,	10/6 to 17/6 up	—
[b] Phosphor Bronze, plain castings ,,	1/1	—
[b] ,, ,, drawn bars & rods ,,	1/-	—
[b] ,, ,, rolled strip & sheet ,,	11½d.	—
[b] ,, ,, wire ... ... ,,	1/0½d.	—
[e] Platinum ... ... per oz.	£12	£2 dec.
[d] Silicium Bronze Wire ... ... per lb.	8½d.	½d. inc.
[g] Spelter ... ... per ton	£13 16s. 3d.	5s. dec.
[r] Steel, Magnet, in bars ... ... per lb.	7½d.	—
[g] Tin, Block (English) ... ... per ton	£202 15s.	£4 15s. inc.
[m] ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by:—

[a] G. Boor & Co.
[b] The British Aluminium Co., Ltd.
[c] Thos. Bolton & Sons, Ltd.
[d] Frederick Smith & Co.
[e] F. Wiggins & Sons.
[f] India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
[g] Henry Gardner & Co., Ltd.
[h] Edward Till & Co.
[i] Bolling & Lowe.
[m] P. Ormiston & Sons.
[o] Johnson Matthey & Co.
[p] C. Clifford & Sons, Ltd.
[r] W. F. Dennis & Co.

New Catalogues and Lists

W. Watts, 44, Wisteria Road, Lewisham, London, S.E.13.—A leaflet on desk and table lamps.

J. A. Crabtree & Co., Ltd., Lincoln Works, Walsall.—A complete catalogue of installation accessories.

British Insulated Cables, Ltd., Prescot.—A leaflet on terminal boxes for moulded insulating material for low-voltage cables.

Instanta Electric, Ltd., 1, St. Paul's Churchyard, London, E.C.4.—A catalogue of the "Instasig" combined personnel location and electric clock system.

Hopkinsons, Ltd., Huddersfield.—A leaflet on centrifugal oil purifiers.

Marconi's Wireless Telegraph Co., Ltd., Electra House, Victoria Embankment, London, W.C.2.—Details of the type D.F.9.10 direction finder.

Bankruptcy Proceedings

R. W. Brown, 72, Promenade, Bridlington, trading as The North Side Radio, radio salesman and engineer.—This debtor was granted his discharge on September 29th, subject to two months' suspension.

T. Ward, 7b, Richmond Street, Bridlington, formerly 15, Princess Street, Bridlington, radio and battery engineer.—This debtor's application for discharge was granted on September 29th, subject to a suspension of four months.

D. J. Spire, Market Place, Bourne, electrical engineer.—This debtor applied for his discharge recently at the Law Courts, Peterborough. It was granted subject to nine months' suspension.

P. K. Eichenberger, wireless dealer, 30, Market Place, Boston.—Last day for receiving proofs for dividend October 14th. Trustee, Mr. E. C. Midgley, 1, St. Swithin's Square, Lincoln, Official Receiver.

S. E. Oliver, electrical and radio engineer, 121, Adnitt Road, Northampton.—First and final dividend of 1s. 6½d. in the £, payable October 6th at 6, The Parade, Northampton.

J. H. Pasco (J. Danning), **wireless engineer,** 10, New Bridge Street, Truro.—Public examination October 12th at the Town Hall, Truro.

R. J. Mann (the younger), wireless engineer, 148, Bearton Road, Hitchin.—Receiving order made September 18th on debtor's own petition. Public examination October 27th at the Court House, Luton.

F. G. Harrison, wireless and electrical contractor, Ramper Charging Station, Saundby.—First and final dividend of 8d. in the £, payable September 24th at 1, St. Swithin's Square, Lincoln.

W. Sims, electrical engineer, 16, St. James Terrace, Buxton.—Receiving order made September 30th on debtor's own petition.

W. Collier, electrical contractor, 24, Princess Road, Urmston.—First meeting October 9th at 20, Byrom Street, Manchester. Public examination October 21st at the Court House, Salford.

J. W. P. Swale, radio and electrical engineer and dealer, 59, Wakefield Road, Moldgreen, Huddersfield.—Last day for receiving proofs for dividend October 19th. Trustee, Mr. W. F. Cresswell, 71, Manningham Lane, Bradford, Official Receiver.

C. W. Tucker (Wilton Wireless Supplies), radio dealer, 11, Silver Street, Wilton, Salisbury.—Last day for receiving proofs for dividend October 16th. Trustee, Mr. H. T. Jones, 12, Rolleston Street, Salisbury, Official Receiver.

R. Mason, radio and electrical engineer, Crown Square, Kirbymoorside.—Supplemental dividend of 5½d. in the £, payable October 16th at 60, High Street, Stockton-on-Tees.

H. Holliday, 4, Highfield Place, Morley, electrician.—This debtor, whose deficiency was stated to amount to £188, appeared for public examination on October 1st at the County Court, Eightlands, Dewsbury. He attributed his failure to lack of capital. The examination was concluded.

Company Liquidations

Automatic Electric Co., Ltd.—Winding up voluntarily. Liquidator, Mr. C. H. W. Brougham (Room 53), Norfolk House, Norfolk Street, W.C.2. This notice is purely formal and all creditors will be paid in full. As reported in our issue of September 18th, this company is being absorbed by the International Automatic Telephone Co., Ltd. (the parent company), the name of which is to be changed to "Automatic Telephone & Electric Co., Ltd."

Pacific & European Telegraph Co., Ltd.—Winding up voluntarily. Liquidator, Sir Alan Rae Smith, 5, London Wall Buildings, E.C.2. The liquidator is authorised to divide amongst the contributories any part of the assets of the company, and may vest any part of the assets in trustees upon such trusts for the benefit of the contributories as he shall think fit.

Spanish Telephone Co., Ltd.—Meeting November 12th at 39, Lombard Street, E.C.3, to receive an account of the winding-up by the liquidator, Mr. H. E. Monson.

Artisco Co., Ltd.—Particulars of claims by October 31st to the liquidator, Mr. W. E. Viney, 63, Coleman Street, E.C.

Private Arrangement

E. Aveyard, trading as Alpha Electric Co., 8, Market Street, Stalybridge.—The creditors of the above met recently at Cheadle, when a statement of affairs was submitted which showed liabilities of £554, of which £415 was due to the trade and the balance of £139 to a cash creditor. The present position was attributed to lack of capital and competition. Provided the matter was dealt with privately the debtor's mother was prepared to withdraw her claim. It was resolved that the debtor should execute a letter of authority in favour of Mr. F. Booth, of Cheadle, and that he should realise the assets and distribute the proceeds *pro rata* amongst the creditors.

Dissolution of Partnership

H. N. Hickley & Co., battery agents and repairers of and dealers in electrical goods and motor accessories, Billett Steet, Taunton.—Messrs. H. N. Hickley and L. W. G. Meikle have dissolved partnership so far as concerns Mr. Hickley, who retires from the firm.

Electricity Supply

Lighting, Domestic, Power

Aberlour.—GAS COMPANY'S APPREHENSION.—The local gas company recently protested against the Town Council's proposal to accept an offer by the Grampian Electricity Supply Co. in connection with street lighting in the town. On behalf of the gas company it was stated that if a lead was given by the Council other residents would follow suit, with disastrous results to the company. Provost Allardyce said he saw the company's point of view, but they in Aberlour could hardly afford to "stick in the mud" while other Councils were doing their utmost to improve street lighting.

Accrington.—POSSIBLE LIGHTING CONVERSION.—The whole of the streets in the town may soon be illuminated by electricity instead of by gas. After an inspection of trial lighting in Avenue Parade and Stanley Street, the Electricity Committee has been asked to submit terms for the conversion of the existing gas lighting.

Ashford (Kent).—AUTONOMY DESIRED.—The Urban District Council is sending a resolution to the Electricity Commissioners suggesting that, in any redistribution of territory under the McGowan Report, Ashford shall be retained as a separate territory with the possible addition of the East Ashford R.D.C. and certain parishes between Ashford and Folkestone. The Council considers that its consumers (who number nearly 8,400) would not benefit if Ashford were absorbed by any of the surrounding undertakings.

Ashington (Northumberland).—DISCHARGE-LIGHTING SCHEME DEFERRED.—After a long discussion the Urban District Council referred back for further information a scheme for the erection of twenty electric-discharge street lamps as an experiment. Members who supported the scheme stated that the lighting of the town's main street was far from good.

Barking.—IMPROVED LIGHTING.—The Council has approved a scheme prepared by the borough electrical engineer for an improved system of lighting in Alfred's Way. The cost will be £1,812.

DISTRIBUTION.—Application is to be made for a loan of £25,000 for reconstructing the distribution system in the area between Longbridge Road and the Tilbury section of the L.M.S. Railway.

Beckenham.—NEW CHARGES.—It is proposed to reduce the charges for electricity as from the meter readings for the Christmas quarter, and consumers will benefit by about £10,000 in the current financial year. The domestic flat rate for lighting will, for instance, be reduced from 4¾d. to 4½d. per kWh. It is emphasised that the undertaking's expansion depends largely on an increased use of domestic apparatus, and for this reason it is proposed to reduce the "unit" charge under the two-part tariff for users of electric cookers to ½d. throughout the year. For charging electric vehicle batteries a new rate of ¾d. per kWh is recommended.

Bexhill-on-Sea.—PUBLICITY FOR COOKER SCHEME.—With the object of advertising its new cooker hire scheme the Electricity Department is undertaking Press publicity, the publication of a brochure and a week's demonstration of electrical appliances.

Bingley.—CHEAPER ELECTRICITY.—The Urban District Council has reduced electricity charges to consumers as from October 1st. The annual standing charge on the rateable-value tariff is now 3s. in the £ on the first £25 and 2s. above that amount, with a running charge of ½d. Meter rents are also reduced.

Blackpool.—NEW TARIFF.—An all-in tariff for large private hotels and boarding houses (not licensed hotels or hydros) has been prepared by the Electricity Department. Mr. H. F. Shanahan (electrical engineer) states that the idea is to encourage cooking and heating by electricity during the daytime, thereby improving the works load factor. Since offering a special tariff for domestic purposes the Department has installed 3,800 domestic cookers.

Bredbury and Romiley.—LOWER CHARGES.—The Urban District Council has reduced the charge for lighting to 4½d. per kWh, for domestic power to 1½d. per kWh, and for small industrial power users to 1d. per kWh.

Bristol.—CONCESSIONS.—Reductions in electricity charges benefiting consumers by £50,000 in a full year are recommended by the Electricity Committee. Increased discounts for payment within twenty-one days will be given under the ordinary lighting rate, the charge for illuminated signs will be reduced from 3½d. to 3d. per kWh, and greatly increased discounts will be given under the power flat rate. The "unit" charge under the domestic all-in rate will be ½d. during the two summer quarters.

Bulgaria.—ELECTRICITY SUPPLY PROGRESS.—Steady progress is being made in the provision of electrical facilities, evidence of which is afforded by the fact that the country's output during 1935 was 140,392,000 kWh, as compared with 138,105,000 kWh in 1934. Sofia is the principal producing centre, being responsible for about 64 per cent. of the output. According to a recent report there are 107 generating stations in the country; the majority, however, are relatively small, there being only five with an annual output of over 10 million kWh.

While the majority of the towns of Bulgaria are now provided with a supply of electricity, however, it is estimated that electricity is available only to about 9 per cent. of the country's rural population.

Canada.—RURAL DISTRIBUTION INVESTIGATION.—It is reported in *Electrical News and Engineering* that the Quebec Electricity Commission is contemplating the organisation of experimental distribution lines in order to obtain statistics regarding the cost of operating and maintaining rural lines, the use of electrical appliances and Quebec farming conditions. Experimental equipment will be installed on farms and kept under the immediate control and observation of the Commission.

Canvey Island.—NO MORE OVERHEAD LINES?—The Urban District Council has consented to the County of London Electric Supply Co., Ltd., erecting overhead cables in certain streets, but has informed the company that there is a definite opinion on the Council that it should not sanction any more overhead wires in the neighbourhood.

Cardiff.—SUPPLY TO PUMPING STATION.—A sub-station is to be erected in Waterloo Gardens for a proposed new pumping station. Mains are also to be extended, and a steel kiosk at Ely is to be replaced by a brick building. The estimated cost of these works is £2,135.

COLOURED COOKERS.—The Electricity Committee has agreed to supply consumers with cookers finished in special colours, provided they pay the additional cost involved.

TWO-PART TARIFF PREPAYMENT METERS.—The electrical engineer having reported that the additional cost of supplying two-part prepayment meters would be 2d. per week, where these are installed they are to be calibrated to meet the additional cost.

Coventry.—SUPPLY TO BERKSWELL.—The electrical engineer recently reported to the Electricity Committee that since the matter of providing a supply of electricity in the Berkswell area was last considered the Meriden Rural District Council had decided to have certain of its houses in the vicinity wired for electricity. It also appeared that the mains, if provided, would be available for completing a ring main which would ultimately become necessary. The estimated cost of providing a supply in Berkswell and in the adjoining areas of Carol Green and Reaves Green was £3,517, and the estimated annual revenue £400. The Committee agreed to provide the supply upon the basis of amended conditions suggested by the Electricity Commissioners.

Dover.—COST OF CHANGE-OVER.—The Town Council has decided to ask for a report on the cost of the change-over. The estimated cost was £30,000, but the chairman of the Electricity Committee (Mr. W. E. Austen) told a meeting of the Council that it had been suggested that the actual cost would be between £70,000 and £80,000.

Eastbourne.—SODIUM LIGHTING CHOSEN.—The Electricity Committee, having inspected experimental lighting systems, has decided to adopt the sodium system in King's Drive, &c.

East Ham.—LOANS.—The Town Council has received sanction to a loan of £2,090 for a sub-station in Church Road, £4,518 for cable extensions and a sub-station at Beckton and Cyprus, and £1,489 in connection with the supply of electricity to the Granada Cinema.

Finchley.—CHANGE-OVER.—The Electricity Committee proposes to make a general application to the Electricity Commissioners for permission to change-over the whole area of supply to a.c. on the understanding that the use of such consent will operate only as and when opportunity occurs.

MAINS AND SWITCHGEAR.—Sanction has been obtained to borrow £3,226 for high-voltage feeder and distributing mains in Hampstead Garden Suburb and £5,267 for switchgear.

Gateshead.—BIG ELECTRIFICATION SCHEME.—The question of installing electricity in 232 houses on the Carr Hill and Sheriff Hill estates at present served by gas is being considered by the Town Council. The North-Eastern Electric Supply Co., Ltd., is to be asked to submit an estimate of the cost.

MUNICIPAL SUPPLIES.—Joint action is to be taken by all Corporation departments to secure a basic charge for electricity from the North-Eastern Electric Supply Co., Ltd., and also to secure a reduction in price.

Guildford.—OBJECTION TO OVERHEAD LINES.—The Rural District Council has decided to object to an application by the Mid-Southern Utility Co. for permission to erect overhead lines along the Hog's Back, Seale, deeming that they would interfere with the amenities of the district.

CHANGE-OVER.—The Electricity Committee is to change the supply to certain large consumers from d.c. to a.c. The total cost of altering the consumers' appliances and apparatus, or, alternatively, of compensating them, is £2,470.

Hungary.—POWER TRANSMISSION ACROSS THE DANUBE.—A 70,000-V transmission line has recently been erected across the Danube near Budapest, the span between the supporting masts on each side of the river being 1,926 ft. Six conductors of galvanised steel, with a section of 95 sq. mm., are used. As there is a difference in height of 90 ft. between the level of the river banks, a single supporting mast 138 ft. high is used on one side, and on the other there are three 49-ft. masts set at distances of 75 ft. The line is carried over the water at a height of about 47½ ft.

Keighley.—LOANS.—The Electricity Committee is to make application to the Electricity Commissioners for sanction to borrow £20,000 for unspecified expenditure on consumers' wiring installations.

Kendal.—INQUIRY.—A Ministry of Transport inquiry was held on September 30th into the proposal of the Central Electricity Board to erect overhead lines in the area from Kendal to Staveley. The proposed route is over the River Kent to Scout Scar and Cunswick Scar, a well-known beauty spot. The cables would then go westward to Staveley. Objections were lodged on behalf of the South Westmorland Rural District Council and the Kendal Town Council. Both authorities contended that the cables could be laid underground without a big difference in cost. Mr. O. A. Sherrard, for the Central Electricity Board, said the line was needed before the winter. It was not being forced on the district by the Board, but was being forced on the Board by the district which wanted the supply. The cost of putting the whole line underground would be £58,378, which would mean that the service in that area would be operated at a loss for all time.

London.—FULHAM.—The Electricity Committee has obtained sanction to borrow £13,050 for street lighting; £21,300, £8,700 and £65,000 for the Earl's Court supply; £10,000 for domestic apparatus; and £154,000 for power station extensions.

BATTERSEA.—The Electricity Committee is seeking sanction to borrow £6,000 for sub-station equipment.

STOKE NEWINGTON.—The Electricity Committee has obtained sanction to borrow £5,000 for mains and services and £3,834 for sub-station equipment.

Lothingland.—OBJECTION TO OVERHEAD LINES.—The Rural District Council has disapproved of an application by the Great Yarmouth Corporation Electricity Department for consent to erect overhead lines at Wrentham and Rushmere, on the ground that they would spoil the amenities of the countryside. The Corporation has been asked to use underground cables.

Lytham St. Annes.—BULK-SUPPLY CHARGES DISCUSSED.—At a recent meeting of the Town Council it was stated that the C.E.B. charges for bulk supply in 1935-36 increased by £11,841, while income rose by only £6,022. It was suggested that local authorities should embark on a vigorous organised protest against the method of charging.

Mansfield.—TENANTS ASK FOR ELECTRICITY.—Tenants of houses belonging to the Corporation have applied for a supply of electricity instead of gas, but there is at present no cable in the particular street. When this is laid a supply of electricity is to be afforded to the houses.

Newcastle-on-Tyne.—ILLUMINATED BELISHA BEACONS.—If a scheme to be submitted by Mr. R. Davidson, city lighting superintendent, is approved Newcastle will soon have illuminated Belisha beacons. Councillor H. J. Armstrong, moving that a scheme should be prepared, said that if the cost of illuminating the globes internally proved too high, reflectors might be fitted to adjacent street lamps to direct light on to the beacon standards and globes.

Plymouth.—COAL-HANDLING PLANT.—The electrical engineer recently submitted to the Electricity Committee an estimate of £15,500 for the extension of the coal-handling plant at the Prince Rock power station (including removal and re-erection of buildings in the works department yard and building a new retaining wall for extension to the coal store). He stated that the Central Electricity Board recommended the adoption of this scheme in view of the resultant reduction of cost of coal handling and the expedition of unloading which is essential in view of the increased generation at the power station under the Board's programme.

FIRE PRECAUTIONS.—Additional protection from fire for the high-voltage switchgear at the Prince Rock station is to be provided by the Electricity Committee at a cost of £1,270.

AMENDED COMMERCIAL TARIFF.—The commercial tariff has been amended. It is to apply to large departmental stores and other establishments in which lighting is more than 80 per cent. of the total consumption. The maximum-demand charge is £5 10s. per kW per annum and the "unit" charge is 0.595d. for the first 200,000 kWh per annum and 0.5525d. for energy in excess of this quantity. The tariff is subject to a minimum guarantee of £1,000 per annum.

ASSESSING THE DOMESTIC FIXED CHARGE.—In order to remove doubts as to the definition of a "living room" for the purpose of assessing the fixed annual charge under the all-in domestic tariff, it is announced that where a kitchen or kitchenette is fitted with running water and a sink or trough it shall not be classed as a living room. Moreover, cellars, greenhouses and garages will not be reckoned for the purpose of assessing premises.

Portree (Skye).—ELECTRIC STREET LIGHTING.—An electric street-lighting system was officially inaugurated on October 3rd.

Russia.—POWER IN THE TRANSCAUCASUS.—It is reported in a Moscow newspaper that the building has been completed of the Kanakir hydro-electric power station on the Zanginsk waterfall of Lake Sevan, with a generating capacity of 88,000 kW. This will be the largest capacity station in the Transcaucasus. The first section (42,000 kW) is being put into operation this year, while the second will be started early next year. The station will supply energy to the rapidly growing industries of Erivan, the capital of Armenia, as well as light and power for the needs of the city.

St. Ives.—Opposition to Overhead Lines.—The Rural District Council is objecting to the erection of overhead cables in the village of Holywell by the Beds, Cambs and Hunts Electricity Co. The Council has requested the company to lay underground cables.

Southgate.—Street Lighting.—Permission has been obtained by the Council to borrow £2,832 for improved lighting in the main roads.

South Shields.—Change-over Negotiations.—In connection with the Town Council's scheme for changing the voltage of the electricity undertaking, correspondence has passed between the Council and the Central Electricity Board (North-Eastern Area). The Board states it is prepared to modify the voltage of the supply if the Council will agree to pay the expenditure as far as extra capital cost is concerned, which it is understood will amount to £7,000. The Council has decided to press for this figure to be reduced.

No Inquiry.—A move to appoint a committee of inquiry into the affairs of the electricity undertaking was defeated by 42 votes to three at the monthly meeting of the Town Council. Alderman J. R. Curbison, moving that a committee should be appointed, said that for years they had been informed that the undertaking was in a sound financial condition. Since April, 1920, the capital expenditure of the department had been £743,484, and of this £355,507 was unredeemed. They were now told the undertaking was obsolete and more money must be "poured" into it to make it efficient. Alderman G. H. Linney (chairman of the Electricity Committee), opposing the motion, said the undertaking had served its purpose in past years, but the time had now come for improvement. Experts stated that the single-phase system should have been changed to three-phase years ago.

Cinema Supplies.—An agreement has been reached between the Town Council and the local cinema proprietors for the supply of electricity at £7 10s. per kW of maximum demand per annum, plus 1d. per kWh for all energy consumed.

Loans.—Application is to be made to the Electricity Commissioners for permission to borrow £10,000 for services. Sanction has been received to a loan of £3,000 for wiring installations.

Undertaking Assessments.—The Town Council is to inform the Incorporated Municipal Electrical Association that it is prepared to support any move which may be made towards securing an amendment of the law governing the assessment of electricity undertakings throughout the country.

Spenborough.—Reduced Charges.—The Urban District Council has reduced its electricity charges as from the September meter readings to the following: Ordinary consumers, 5d. per kWh. Rateable value tariff, 15 per cent. on the first £50 and 10 per cent. above, with a "unit" charge of ½d.

Stalybridge and District.—Reduced Charges for Illuminations.—The Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board has adopted a special reduced scale of charges for the supply of electricity for illuminations at Christmas and at the Coronation. Under this scheme the charges for the hire of lamps and wiring are:—Festoon or strip lighting: 100 points for eight days, 35s.; 100 points for first additional seven days, 20s.; and 100 points for each successive seven days, 10s. The hire terms arranged for apparatus are:—Floodlighting projectors: (a) 1,000 W, 15s.; (b) "Osira" red, 400 W, £2; (c) Revo, 500 W, 7s. 6d.; (d) G.E.C., 500 W, 7s. 6d.; (e) Wardle, 500 W, 2s. These prices are for hire over a period of eight days only. If required for longer periods, the additional charges are: (a) 1s. 6d. per day; (b) 3s. per day; (c) and (d), 9d. per day; and (e) 2d. per day. All energy will be metered at 1d. per kWh net.

Turkey.—As a first step in its electrification programme the Government has decided to construct two large central electric generating plants. One of these will be erected at Karwbuck, near Zonguldak, with 65,000 h.p. of plant. The other will be at Kutshaya, with 4,000 h.p. of plant, and will use lignite as fuel. Negotiations for the construction of the plants are being made with a German group.

Wallasey.—Lower Charges.—The Council has decided to reduce its electricity charges after the September meter readings. Those for lighting and small power supplies are to be lowered by ½d. per kWh.

Whitley and Monkseaton.—No Surcharge.—Expressing the opinion that the members of the Urban District Council who last year voted in favour of expenditure on illuminations acted in good faith, the Ministry of Health has ordered that they shall be relieved of the liability to surcharge. In the first place objections to the expenditure of money on illuminations were lodged by Mr. E. Gandy at the annual audit of accounts, and this was upheld by the district auditor (Mr. H. W. Magrath). The councillors concerned then decided to appeal to the Ministry of Health. A sum of £1,268 was spent, but the surcharge was limited to £500. This season the illuminations were carried out by public subscription by the local Entertainments Committee, but steps are being taken for depositing a Bill in Parliament to give the Council powers to carry out such schemes in future.

York.—Loans.—The Electricity Committee is seeking sanction to borrow £12,000 for domestic apparatus for hiring, £7,000 for sub-stations and equipment, and £1,000 for meters for rural areas.

Traction

Australia.—Railway Electrification Urged.—Representations have been submitted by the Electrical and Radio Association of New South Wales to the Deputy Premier and Minister for Transport urging the Government to proceed with the electrification of railway lines to important country centres, north, south, east and west of Sydney. It is felt that the carrying out of this work would create many benefits to the public in general, particularly in the direction of more rapid transport at lower cost, the possibility of cheaper electricity to country residents, and, of paramount importance, the creation of employment for many thousands of workers.

East Ham.—Tram Service Ceases.—The thirty-five years' old tramway service between Wanstead Park and the Royal Albert Docks has been discontinued. It is described as the first to be operated in or near London.

Manchester.—Benefits of Electric Traction.—Figures concerning the operation of the Manchester South Junction and Altrincham Railway under steam and electric conditions are given in a paper read recently by Mr. F. W. Wheddon, district passenger manager, Manchester, at a meeting at Nottingham, and summarised in the *Railway Gazette*. Immediately prior to electrification, he states, intensive competition from road transport led to the abstraction of rail passengers at the rate of one million per annum. The electric service began in May, 1931, and at the end of the fifth year the total annual number of local passenger journeys had increased from 5,033,643 (in the last year of steam traction) to 9,521,297, a growth of 89 per cent. There was justification for the belief that the anticipated accretion of 100 per cent. would be fully achieved. Local revenue likewise showed a good improvement (76 per cent.), and after allowing for the increased working costs there was a satisfactory return on the new capital employed. He observed that since the electric service was inaugurated road facilities had been further increased without apparent justification, which had tended to retard the growth of railway revenue. In such circumstances it was not to be expected that the railways would be prepared to sink further capital in electrifying local services. On the general question of electrification in the Manchester area, Mr. Wheddon said that the plan for electrifying the main line between Sheffield and Manchester, including the Glossop branch, would have an important bearing on the problem, as then only short sections of line would need to be wired for overhead power distribution to bring the most important L.N.E.R. suburban services within the scope of the complete scheme.

Newcastle-on-Tyne.—Further Trolley-bus Routes Proposed.—Preliminary steps are to be taken immediately by the City Council to secure sanction to run trolley-buses on additional routes. The thoroughfares concerned include: Westgate Road, Brighton Grove, Crossley Terrace, Dilston Road, Callerton Place, Stanhope Street, Barrack Road, Gallowgate, Blackett Street, New Bridge Street, Byker Bridge, Shields Road, Union Road, Bothal Street, Welbeck Road, Church Street, Walker Road, Market Street, Grainger Street, Pilgrim Street and the Fossway.

Communications

Great Britain.—Television Demonstrations.—A demonstration television receiver has been installed at the Science Museum upon which the British Broadcasting Corporation transmissions from the Alexandra Palace will be received. The receiver has been lent by the courtesy of Messrs. A. C. Cossor, Ltd., and is of the type which is now available to the public for home reception. A special aerial has been erected on the roof of the Museum, and the receiver has been installed in one of the basement galleries, where provision has been made for visitors to see the demonstrations. Demonstration reception of the B.B.C. transmissions will be shown on the Museum receiver daily from 11 a.m. to 12 noon and from 3 to 4 p.m. (Sundays excepted).

Automatic Telephony.—A further step in the improvement of the telephone service in Aberdeenshire was the change-over on September 29th of the exchange at Rothienorman to automatic working. More than half the telephones in the county are now working on automatic exchanges.

Television Reception at Waterloo Station.—According to *The Times*, the Southern Railway is introducing regular television programmes at Waterloo Station. Every week-day, except Saturdays, the programme broadcast from Alexandra Palace will be shown in the waiting-room opposite platform 16 from 11 a.m. to noon and from 3 to 4 p.m. Admission is free, but is restricted to the holders of railway tickets.

The Coronation.—Other television news relates to the Coronation. It is reported in the *Daily Telegraph* that a van is now under construction which will be equipped to televise the passing pageant, operating on the Marconi-E.M.I. system. Emitron cameras will be used.

New Hull Telephone Tariff.—The telephone manager recently reported that the tariffs did not specially cater for subscribers who required less than 400 local outward calls per annum, and he recommended the adoption of a new tariff applicable to business premises or private residences of £4 per annum, payable quarterly in advance, including 200 outward local calls per annum, extra calls to be charged at 8s. 4d. per 100, payable in advance. The recommendation was adopted.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Australia.—MELBOURNE.—December 1st. State Electricity Commission of Victoria. Two transformer circuit-breakers, one bus tie circuit-breaker unit, one station transformer circuit-breaker unit, eight feeder circuit-breaker units, two current transformers and transfer trucks. (T. 30804.)*

Ayr.—County Council. Electric lighting at Kirkmichael, Crosshill, and Fisherton new constabulary stations. County architect, County Buildings, by October 12th.

Bradford.—October 29th. Transport Committee. Various stores, including electrical fittings for vehicles, insulating material, wire, copper controller contacts and electrodes, for twelve months from January 1st next. Transport general manager, 11, Forster Square.

Bridlington.—October 15th. Town Council. New posts and fittings for the conversion of the main street lighting to electric-discharge illumination, together with minor improvements. (October 2nd.)

Bristol.—October 12th. Town Council. One set of vehicle-actuated traffic signals. City engineer, 6, Queen Square.

Cannock.—October 24th. U.D.C. Electricity Department. Two 3-panel, 3-phase, 6,600-V, truck-type switchboards. (See this issue).

Cardiff.—October 16th. Electricity Department. Six 500-kVA, 3-phase transformers. (October 2nd.)

Dundee.—October 14th. Corporation. Arc lamp carbons for burning in "Angold" yellow flame magazine arc lamps. (See this issue.)

October 16th. Electric lighting installation at Beechwood housing estate. City quantity surveyor, 21, City Square.

Dunoon.—Town Council. Various works, including electrical, at forty-six houses. W. Rodger, burgh surveyor, Municipal Buildings (deposit £1 1s., by October 10th).

Egypt.—CAIRO.—November 2nd. Ministry of Public Works, Mechanical and Electrical Department. Electrical fittings for one year, including lamps, wires, tubes, cables, switches, &c., for pumping and power stations. Inspecting engineer, Egyptian Government, 41, Tothill Street, London, S.W.1.

Erith.—October 19th. U.D.C. Electricity Department. Tubular heaters and thermostats, water heaters, cooker and inset fires for the bulk supply station, Walnut Tree Road. (See this issue.)

Fife.—October 13th. County Council. Electrical work at new clinic, Buckhaven. G. Sandilands, County master of works, Property and Works Department, County Offices, Kirkcaldy (deposit £1 1s.).

October 19th. Electric lighting of forty-four houses at Kinglassie. C. R. Douglas & Son, 15, East Port, Dunfermline (deposit £1 1s.).

Grangemouth.—October 27th. Town Council. Works in connection with the construction of an electrically operated steel swing bridge at Junction Dock, and an electrically operated steel bascule bridge at Lock No. 2. Crouch & Hogg, civil engineers, 17, Lynedoch Street, Glasgow, C.3 (deposit £5 5s.).

Horsham.—October 27th. R.D.C. Electrically driven air compressor and one and/or two electrically driven centrifugal booster pumps, complete with automatic control gear, for the Crawley water works. Council's water engineer, Council Offices, Storrington, Sussex (deposit £2 2s.).

Horwich.—October 12th. U.D.C. Installation of electricity, including fittings, at the Maternity and Child Welfare Centre, Jones Street. T. Green, electrical superintendent, Public Hall.

Hull.—October 14th. Education F. and G.P. Sub-Committee. Electrical installation at the Endike Lane East school. D. Harvey, city architect, Guildhall (deposit £1 1s.).

India.—NEW DELHI.—October 27th. Stores Department. 4,500-kW, 6,600-V turbo-alternator set, condensing plant and auxiliaries. (T. 30779.)*

November 3rd. Silk and cotton covered copper wire for winding purposes, during the year from March 1st, 1937. (T. 30822.)*

November 17th. Single-core, flameproof and slow-burning locomotive and engine head light cable. (T.Y. 30837.)*

October 31st. Dry core, p.i., lead-sheathed, and armoured underground cables. (T. 30842.)*

Irish Free State.—DUBLIN.—October 12th. Electrical work in connection with the extensions of the Roscrea meat factory. McAteer & MacEntee, consulting engineers, 9, Dawson Street (deposit £5).

Lanark.—County Council. Various works, including electric lighting and heating installation, at Chapelhall R.C. school, and heating, ventilating, and electric lighting installation at new block at Hairmyres Colony. J. Stewart, county architect, 32-36, Albert Street, Motherwell, by October 12th.

Manchester.—October 29th. Electricity Department. 33-kV and 6.6-kV, 3-phase, a.c. switchgear at Dickinson Street sub-station; four 660-V, d.c. switchboards at various sub-stations; and 420-V, 3-phase, a.c. switchgear at the Barton-upon-Irwell power station. (October 2nd.)

Middlesex.—October 22nd. County Council. Eleven electrical service lifts at the Shenley Mental Hospital (September 25th.)

October 28th. Electrical installations at the new Grammar School, White Hart Lane, Tottenham. (October 2nd.)

Newcastle-upon-Tyne.—October 10th. Transport and Electricity Committee. Twenty-five double-deck trolley-buses with chassis and electrical equipment. T. P. Easton, general manager, transport and electricity undertaking, Manors (deposit £2 2s.).

New Zealand.—WELLINGTON.—November 10th. Public Works Department. Nine switch-fuse limiting resistance combinations and five sets of galvanised steel structures, each set to carry one 100-kV, 3-phase switch-fuse limiting resistance combination, with climbing steps and brackets for switch operating mechanism. (T. 30798.)*

November 24th. Seven 1,000-kVA, 50-kV/11-kV, oil-immersed, single-phase transformers and spares for the Arapuni power scheme, section 527. (T. 30803.)* One distribution switchboard for the control room at the Arapuni power station. (T. 30843.)*

December 2nd. Post and Telegraph Department. 5,000 50-V switchboard lamps. (T.Y. 30845.)*

Portsmouth.—November 3rd. Electricity undertaking. Circulating water pumping plant. (See this issue.)

Preston.—October 12th. Corporation. Wiring for electric lighting at the Institution, Fulwood. (September 25th.)

Salford.—October 20th. City Council. 5,000-yd. of l.v. four-core, p.i., l.c. cable (See this issue)

Shoreham-by-Sea.—October 19th. U.D.C. Alternative tenders for lighting Parkside Street, Kingston-by-Sea, by electricity or gas. J. Dunn, surveyor, Town Hall.

Sleaford.—October 19th. U.D.C. Electricity Department. One steel kiosk; e.h.v. and l.v. switchgear. (October 2nd.)

South Africa.—CAPE TOWN.—October 21st. Electricity Department. 230-V electric lamps of various wattages. (T. 30792.)* Single- and double-pole iron-clad service cut-outs. (T. 30795.)* Overhead line material. (T. 30796.)*

October 28th. Two 3,000-kVA transformers. (T.Y. 30797.)*

JOHANNESBURG.—October 26th. Railways and Harbours Administration. Telegraph material. (T.Y. 30826.)*

RUSTENBURG.—October 30th. Municipality. Three 250-kW generators, engine room crane, condensing plant, circulating water plant, switchgear, transformers, erection gear, transfer of existing engines and electric master clock. (T. 30790.)*

PRETORIA.—November 20th. Public Works Department. Call system for the Groote Schuur Hospital. (T.Y. 30840.)*

Southend.—November 19th. Electricity Department. One 750-kW alternator. (September 25th.)

Stockton-on-Tees.—October 23rd. Borough Council. 11,000-V, three-phase and l.v. sub-station switchgear; two 750-kVA indoor transformers; five kiosks complete with transformers and switchgear; and one 200-kVA outdoor transformer. (See this issue.)

Uruguay.—MONTEVIDEO.—November 13th. State Electricity Supply and Telephones Administration. Electric metering apparatus, consisting of voltmeters, ammeters, &c. (T.Y. 30788.)*

November 17th. Insulating tape. (T.Y. 30808.)*

November 20th. 3,000 porcelain insulators for overhead power transmission lines. (T.Y. 30809.)*

Wednesbury.—October 13th. Borough Council. Electric wiring, &c., at forty-six houses and two houses and shops combined. A. Booth, borough engineer, Town Hall (deposit £1 1s.).

West Ham.—October 15th. Education Committee. Electric lighting at the extension of Fyfield residential open air school. (October 2nd.)

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Barking.—Electricity Committee. Recommended. Switchgear at sub-stations: Axe Street.—A. Reyrolle & Co. Upney.—New Switchgear Construction Co. E.h.v. cables (£4,471).—Telegraph Construction Co. Transformer (£1,162).—British Electric Transformer Co.

Cardiff.—Works Committee. Accepted. Two electric drainage pumps (£1,618).—Harland Engineering Co.

Electricity Committee. Accepted. Wilson electric van.—W. Lewis & Sons. Fire protection apparatus at Park Lane sub-station (£521).—Walter Kidde Co. Switchgear at sub-stations: Fairoak (£162) and Cowbridge (£161).—Ferguson Pailin, Ltd. Currans (£600).—Whitehead Switchgear, Ltd. Llandaff Fields (£135).—G.E.C. Six oil-immersed isolators (£37 each).—Ferguson Pailin, Ltd.

Essex.—County Council Health Committee. Accepted. Electrical installations at extensions to Black Notley Sanatorium (£2,000).—Essex Electrical Installations, Ltd. Electrical installations at extensions to Oldchurch Hospital (£676).—F. R. Skeels.

Falkirk.—Town Council. Accepted. Electric lighting in 382 houses at Bog Road (£2,453).—T. Laurie & Co.

Finchley.—Electricity Committee. Accepted. Fifteen transformers (£2,052).—Bruce Peebles & Co. Four kiosk sub-stations (£726).—Crompton Parkinson, Ltd. Switchgear (£2,213).—A. Reyrolle & Co.

Glasgow.—Cleansing Committee. Accepted. Four electrically driven refuse collecting vehicles (£3,463).—Met.-Vick. Electl. Co.

Corporation. Accepted. Electrical goods lift at Buchan Street stores (£451).—A. & P. Steven.

Health Committee. Accepted. Electrical installation in the new Outdoor Medical Service Clinic (£119).—A. & C. Edelman.

Housing Committee. Accepted. Electrical work at houses in Greenhaugh Street.—A. & C. Edelman.

Police and Lighting Committee. Accepted. 500 steel poles (£4,419).—Stewarts & Lloyds.

Hertfordshire.—Assistance Committee. Accepted. Rewiring and other electrical work at Barnet Hospital (£2,176).—Pinching & Walton.

Hull.—Electricity Committee. Accepted. Boiler modifications at Sculcoates power station (£5,476).—E. Green & Son. 22,000-V switchgear (£2,597) and reconditioning two switches (£450).—A. Reyrolle & Co. Remote control gear for High Flags pumping scheme (£406).—Bertram Thomas.

Lancaster.—Health Committee. Recommended. Electrical equipment on the Newton estate (£1,523).—W. H. Inman.

Luton.—Town Council. Accepted. Electric lighting in houses (£1,658).—A. T. Snowden.

Northern Ireland.—Belfast.—Electricity Committee. Accepted. Auto transformer (£123).—English Electric Co. Feed-water meter (£240).—Electroflo Meters Co. Three-phase, l.v., high rupturing capacity switchgear (£3,096).—Standard Switchgear, Ltd. Fire hydrants, oil fire extinguishing equipment and portable fire extinguishers.—Mather & Platt, Ltd. (£2,183); Foamite Firefoam, Ltd. (£299). 5,700-kVA three-phase neutral earthing compensator.—Hackbridge Electric Construction Co. (£235); Met.-Vick. Electl. Co. (£380). Battery driven rail locomotive (£340).—J. Dowling & Sons.

Plymouth.—Electricity Committee. Accepted. L.v. distribution boards for twelve months.—W. Lucy & Co. Cables.—B.I. Cables, Ltd.

Salford.—Light, Heat and Power Committee. Accepted. Three-phase, oil-immersed, power transformers during twelve months ending September 30th, 1937.—Met.-Vick. Elecl. Co.

Sheffield.—Electricity Committee. Accepted. Five 600-kVA, 11,000/440-V, 3-phase, double-wound, self-cooled transformers for the Neepsend generating station (£1,220).—Electric Construction Co.

Stirlingshire.—County Council. Accepted. Electric lighting at 100 houses at Bannockburn (£563), and seventy-two houses at Bonnybridge.—T. Laurie & Co. Electric lighting at twenty-six houses at Balfron (£148).—A. H. Smillie.

Forthcoming Events

Institution of Electrical Engineers.—(*Western Centre*).—Monday, October 12th. Municipal Technical College, Bath. 6 p.m. Chairman's inaugural address by Mr. J. W. Spark.

(*North Midland Centre*).—Tuesday, October 13th. Hotel Metropole, Leeds. 7 p.m. Chairman's inaugural address by Mr. S. R. Siviour.

(*South Midland Students' Section*).—Tuesday, October 13th. James Watt Memorial Institute, Birmingham. 7 p.m. Chairman's address by Mr. J. D. Evershed.

(*South Midland Centre*).—Wednesday, October 14th. Grand Hotel, Birmingham. 7 p.m. Chairman's inaugural address by Mr. E. A. Reynolds.

Association of Mining Electrical Engineers.—(*South Wales Branch*).—Saturday, October 10th. South Wales Institute of Engineers, Cardiff. 6 p.m. Address by Mr. S. B. Haslam.

Diesel Engine Users' Association.—Monday, October 12th. 56, Victoria Street, London, S.W.1. 4.45 p.m. "The Present Position of Special Steels for Diesel Engines." Dr. S. F. Dorey.

Institute of Transport.—Monday, October 12th. Institution of Electrical Engineers, London, W.C.2. 5.30 p.m. Presidential address by Sir Alfred Read.

Association of Supervising Electrical Engineers.—Tuesday, October 13th. College of Technology, Manchester. 7.15 p.m. "Electric Discharge Lamps." Mr. W. Rule.

Illuminating Engineering Society.—Tuesday, October 13th. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2. 4.30 p.m. Presidential address by Mr. A. Cunnington.

Institution of Heating and Ventilating Engineers.—Tuesday, October 13th. Institution of Mechanical Engineers, London, S.W.1. 7 p.m. "Warmth and Comfort." Mr. T. Bedford.

Institution of Engineers-in-Charge.—Wednesday, October 14th. St. Bride Institute, London, E.C.4. 7.30 p.m. Presidential address by Mr. Asa Binns.

National Smoke Abatement Society.—Wednesday, October 14th, to Saturday, October 17th. Annual conference.

British Institute of Radiology (Röntgen Society).—Thursday, October 15th. Reid-Knox Hall, London. 8 p.m. Presidential address by Professor J. A. Crowther on "Physics and Radiology."

Institute of Fuel.—Thursday, October 15th. Institution of Mechanical Engineers, London, S.W.1. 2.30 p.m. Presidential address by Sir Philip Dawson. 6.45 for 7.15 p.m. Connaught Rooms, London, W.C.2. Annual dinner and dance.

Birmingham Electric Club.—Friday, October 16th. Grand Hotel, Birmingham. 7.15 p.m. Annual ladies' evening.

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

Adapta sunk iron switch box to accommodate any make of standard switch.

Paramount advertising turntable.

Opeda kettle.

Wilcom massage apparatus.

Tools and material for neon sign production.

Readers should enclose stamped addressed envelopes when making their inquiries.

Notes

Faraday House Old Students' Association

The twenty-eighth annual dinner of the Faraday House Old Students' Association will be held on October 30th at the Savoy Hotel. Mr. H. W. Swann, H.M. Senior Electrical Inspector of Factories, president of the Association, will be in the chair. Members of the Association are reminded that they may introduce guests who need not necessarily be Faradians. Application for tickets, price 12s. 6d. each, should be made to the hon. secretary, 66, Southampton Row, London, W.C.1.

The Midland Electrical Engineers' Ball

The annual Midland Electrical Engineers' Ball will be held on November 13th at the Grand Hotel, Birmingham, under the presidency of Mr. S. T. Allen, Central England engineer, Central Electricity Board, Birmingham. The chairman of the Committee is Mr. W. H. Heaton, and the hon. secretary and treasurer is Mr. W. Y. Anderson, 12, Richmond Park, Olton, Warwickshire. Tickets can be obtained from any committee member.

Artificial Fog Tests

Data collected for tests carried out during the past three winters on fog beacons of the type shown at last year's Shipping Exhibition by Sinterae, Ltd., are claimed to have indicated a substantial increase in visibility with their use. As fog tests cannot, however, be carried out as and when required, the company, in collaboration with Mr. C. Cooper, has designed the Cooper-Toplis fog-testing tank, in which to a supporting medium of clear water a fluid has been added, representing visually a fog condition. This synthetic fog has a composition, particle size and density which can be conveniently measured and is independent of the weather. The semi-transparent particles have an average size of 0.0001—rather smaller than natural-fog particle—and a calculated density of about 2.7×10^9 per cu. cm., giving a visibility of from 6 to 7 in. A density greater than that occurring in nature is used in order to reproduce in a tank measuring only 36 in. the physiological conditions obtaining when viewing a full size beacon at 1,000 ft. or so. Observations made by fourteen persons with the fog-testing tank have shown an average of 30 per cent. improved visibility in daylight fog for a flickering light. This figure is close to that obtained in natural fog for which a mean visibility of thirty-five per cent. is said to have been obtained over a period of five months at distances of from 300 to 900 ft., with a maximum increased visibility of sixty-four per cent.

E.A.W. Activities

On September 23rd Mr. J. W. Beauchamp, commercial manager of the Central Electricity Board, gave a lecture to the Coventry Branch and Teachers' Circle of the Electrical Association for Women on "Tariffs and Methods of Charging for Electricity." About seventy members and friends were present.

A Lewisham section of the London Branch is to be formed and an inaugural meeting will take place on October 20th at the Town Hall. The chairman of the section is Mrs. Deave and the hon. secretary Miss E. M. Spurgeon.

World Power Conference Year Book

The first number of the Statistical Year Book of the World Power Conference will be published on October 28th. This volume will contain an inventory, based upon the latest available estimates, of the power resources of the world, and annual statistics, relating to 1933 and 1934, of the production, stocks, imports, exports and consumption of solid and liquid fuels, natural gas, water power and electricity. Statistics for about sixty countries will be included, and where practicable, Continental and world totals will be presented. The tables will be accompanied by explanatory text. The statistics have been compiled according to standard definitions which are reproduced in the text, and it is believed that the volume will constitute the most comprehensive collection of closely defined and comparable statistics of power resources, development and utilisation yet published. It will be obtainable from the Central Office of the World Power Conference, 36, Kingsway, W.C.2, the price being £1.

Appointments Vacant

Engineer and manager for the Stafford Electricity Department.

Assistant secretary and assistant accountant for Birmingham Electric Supply Department.

Meter mechanic for Brighton Electricity Department.

Power station assistant, maintenance engineer and draughtsman engineering assistant.

Cable jointer for Perth Electricity Department.

Cable jointer for Bacup Electricity Department.

Civilian technical officer for the Department of Scientific Research and Experiment, Admiralty.

Lady as trainee for electrical housecraft for Cheltenham Electricity Department.

Mains assistant for East Grinstead Electricity Department.

Electric cooking demonstrator and showroom assistant for Darlington Electricity Department.

Temporary electrical engineering assistants in the drawing office for the Air Ministry.

Junior mains assistant and shift charge engineer for the Battersea Borough Council.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

At the Silver Jubilee Conference of the British Commercial Gas Association at Bath, on Monday, **Sir Francis Goodenough** was presented with a cheque and an illuminated address to mark his retirement from the position of executive chairman, after 25 years' service.

Mr. R. C. Toogood, late manager of Messrs. F. D. Newcombe & Co., Ltd., and formerly manager of Southern Factors, Ltd., has been appointed manager of Messrs Dormor & Co., Ltd., electrical and radio wholesalers, of Bournemouth, in succession to **Mr. O. A. Plimsaul,** who has resigned to take up an appointment with British Thomson-Houston Co., Ltd.

Mr. C. Pipkin and **Mr. P. V. Hunter** have been appointed joint managers of the Anchor Cable Co., a subsidiary of Callender's Cable & Construction Co., Ltd.

[*Elliott & Fry*
Mr. H. W. Bosworth

Mr. H. W. Bosworth, managing director of the Lancashire Dynamo & Crypto, Ltd., is to leave to-day (Friday) on the R.M.S. *Dunbar Castle* for South Africa. In addition to visiting the various agencies of the company, Mr. Bosworth will attend the Johannesburg Empire Exhibition, where several of the company's machines are to be seen. He expects to complete his tour in time to enable him to return to this country during the early part of January.

Mr. A. R. Fearnley, general manager of the Sheffield Corporation Transport Department, is to retire on superannuation in December.

Mr. Howard Foulds, secretary and advisory director of Callender's Cable & Construction Co., Ltd., has been largely responsible for the fusion of the Incorporated Secretaries' Association with the Chartered Institute of Secretaries, for which a supplemental charter has been approved. He was president of the Chartered Institute when the fusion was initiated and chairman of the committee which handled the matter.

Mr. M. C. Morley has been appointed by the Fulham Borough Council as chief assistant to the chemist at the new power station at a salary of £337 per annum. Mr. Morley has been in the service of the Council for the past nineteen years, and has for some time past carried out all the chemical work necessary at the existing power station.

The Council of the Illuminating Engineering Society has awarded the Gaster Memorial Premium to **Mr. R. G. Hopkinson** for his paper on "The Photographic Representation of Street Lighting Installations" read before the joint meeting of the Illuminating Engineering Society and the Royal Photographic Society last December. **Mr. W. R. Stevens** is to receive the Silver Jubilee Commemoration Award for his experimental work on "Thermal Endurance of Illuminating Glassware." These two awards will be made at the opening meeting of the Illuminating Engineering Society on October 13th.

Mr. G. T. Hindmarch, electrical engineer at the Skinningrove Iron & Steelworks, Brotton, who is retiring after twenty-seven years' service, has been presented by the staff with an inscribed electric clock.

Mr. P. H. Taylor, mains assistant and draughtsman with the Blackburn Corporation Electricity Department, has been appointed to the position of assistant mains engineer with the Eastbourne Corporation Electricity Department.

Mr. A. E. Hargreaves has retired from the employ of the Eastbourne electricity undertaking after twenty-six years' service. He was for many years superintendent of the showrooms and latterly was engaged in the consumers' engineer's department. He has been presented by the staff with an electric striking clock.

Mr. H. H. Swift has been appointed assistant electrical engineer to the London & North Eastern Railway as from October 1st. Since July, 1934, Mr. Swift has been assistant manager of the Traction Department of the English Electric Co., Ltd., in London, by whom he has been employed for the past sixteen years. Mr. Swift obtained the degree of Bachelor of Engineering at Adelaide University, South Australia. Subsequently he entered the works of Messrs. Siemens-Schuckert, Berlin, and during the war was interned as a civil prisoner of war at Ruhleben. In March, 1920, he joined the Electric Traction Department of the Dick Kerr Works of the English Electric Co., at Preston. Since that time he has represented the company for three-and-a-half years in Japan in connection with contracts for electrification work on several Japanese railways, and for three years in South Africa in connection with the electrification of the Capetown-Simonstown line of the South African Railways. Mr. Swift has also paid many visits to Denmark and Poland on electrification contracts secured by the English Electric Co.

Obituary

Dr. Ing. E. Nicolini.—The death recently occurred at Gardone, Italy, at the age of sixty-four, of Dr. Ing. Eugenio Nicolini, a well-known Italian electrical engineer who had for many years resided in France, where he occupied the position of director of the undertakings of the Société d'Electricité de Paris and the Société d'Electricité de la Seine. He was a leading authority on steam-operated electricity generating stations, and took an active part in the design and construction of the big plants at Ivry and St. Denis, on the outskirts of the French capital. In recognition of his work the late Dr. Nicolini was appointed an Officer of the French Legion of Honour and a Commander of the Order of the Crown of Italy.

Sir H. Fox.—The death occurred at Broadstairs on October 2nd, at the age of sixty-four years, of Sir Harry Fox, who was Commercial Counsellor at Peking until his retirement in 1930. He was in the British Consular Service in China from the year 1890, and had devoted his life to treaty and trade matters. He had, of course, a special knowledge of the changing Chinese trade position, and was confident concerning British trading possibilities if only our manufacturers and traders would make a study of the special requirements of the Chinese market.

Mr. A. B. Cannon, who died on September 30th, was secretary and director of T. B. Morley & Co., Ltd., electrical factors, Jameson Street, Hull, and had been associated with the business for twenty-nine years. He was a well-known Rotarian and Freemason.

Mr. T. Crichton Fulton, consulting electrical engineer, died recently at Paisley. He was engaged in his early days with the Paisley Telephone Co., and afterwards was in business at Glasgow as a consulting electrical engineer.

Mr. N. Kerr.—The death is announced of Mr. Nigel Kerr, former superintendent of the Eastern Telegraph Co. at Aden, Bombay and Carcavellos. It occurred at Estoril, Portugal, on September 22nd, at the age of seventy-two.

Electricity Supply Trends Overseas

DUE to the introduction of restrictive measures it was impossible to obtain rubber scrap for milling purposes in the George Town, Straits Settlements, last year, a fact which seriously affected the consumption of electricity for power purposes. Consequently, the annual report of the electricity undertaking, of which Mr. T. Rogers is the municipal electrical engineer, shows that while there was an increase of nearly 1¼ million kWh in electricity generated during 1934 as compared with 1933, sales fell away by 598,638 kWh to 11,557,304 kWh in 1935. The actual loss in power supplies was 1,218,727 kWh, but there were compensating increases in other directions. The average price received per kWh for all purposes during 1935 was 10.30 cents, against 9.74 cents for 1934, and the net surplus was substantially higher ($123,352 against $105,043). In view of this the price for lighting has been reduced from 2¾ to 2¼ c. The number of consumers rose from 11,459 to 12,072, representing an increase in load of 205 kW to 12,208 kW. The hiring department also made progress; the number of motors hired out increased from 207 to 233, fans from 2,499 to 2,584, cookers from 195 to 229, and water heaters from 165 to 175.

The general manager of the Wellington (N.Z.) Electricity Department, Mr. M. Cable, reports an improvement in the financial position of the undertaking during 1935-36, the revenue increasing from £313,921 to £338,611. The working expenses rose by £18,330 to £201,540, and the net surplus was £43,401, an increase of £29,125. The total quantity of electricity generated and purchased from the New Zealand Government Mangahao hydro-electric supply was 63,089,000 kWh.

The year 1934 marked the commencement of a new phase in the working of the Cape Town (South Africa) municipal electricity undertaking in that it was the first complete year of operating the Council's generating station at Dock Road with the Salt River power station of the Electricity Supply Commission under the arrangement prescribed by the agreement for the pooled generation of electricity entered into between the Council and the Commission in 1933.

Under the pooling system the Dock Road plant is used as a load-regulating station to enable the Salt River station to be worked with a minimum of load fluctuations.

The total quantity of electricity sold increased from 105,494,806 kWh to 123,549,763 (17.1 per cent. increase), due largely to the inauguration of a hire-purchase scheme for domestic appliances. As in previous years, the greatest increase in energy sold occurred under the heading of "lighting, heating and cooking," for which purposes sales to private consumers in the municipal area were 72,837,549 kWh, an increase of 23.4 per cent. Of the total, 60,495,654 kWh was sold under the domestic rates, representing an increase of 30.6 per cent. Outside the municipal area there was an expansion of 34.1 per cent. in sales of this kind. Electricity sold during the year per private consumer, based on the number of consumers connected to the mains at the end of the year, was 3,016 kWh against 2,755 kWh, the actual number of consumers increasing by 7.7 per cent. to 38,229.

Several new factories were established in the supply area during the year, and this fact, together with the improvement in industrial conditions, resulted in increases of 7 per cent. in motive power sales and under special contracts.

The number of appliances sold on the hire-purchase system increased from 3,332 in 1933 to 3,958 in 1934, the latter number comprising 2,847 cookers, 245 refrigerators, 537 water heaters and 60 washing machines. A sum of £277,181 was collected at the showrooms as compared with £176,423 during 1933.

The foregoing figures are taken from the recently issued report of the city electrical engineer, Mr. G. H. Swingler.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

National Association of Radio Retailers, Ltd.—Registered on September 29th as a company limited by guarantee with a nominal capital of £500 in 10,000 shares of 1s. each. Each member is liable for £1. The objects are to promote and protect the trade of radio retailers in Great Britain and Ireland. The management is vested in a Council. The N.E.C.T.A., Ltd., may nominate four members of the Council while holding 9,000 shares. The directors are: R. H. M. Drake, Burnt House, Cuckfield, Sussex; H. J. Galliers, 4, West Drive, Queen's Park, Brighton; C. R. Spouge, "Sadhana," Wragby Road, Sudbrooke, Lincoln; F. J. Smith, 32, Highway Road, Leicester; J. Walsh, 22, Buncer Lane, Blackburn; A. C. Watts, 48, Grosvenor Road, Tunbridge Wells; and L. C. Penwill, Greenside, Woodlands Road, Surbiton (director and secretary of N.E.C.T.A., Ltd.), who is also secretary. The registered office is at 23, Bedford Square, W.C.1.

International Automatic Telephone Co., Ltd.—Private company. Registered October 1st. Nominal capital, £100. Objects: To carry on the business of manufacturers of and dealers in automatic and other telephones, telegraphs, wires, cables and lines, &c. The subscribers are: S. G. Lloyd and E. J. Alldis, both of 2, Bond Court, Walbrook, E.C.4. Solicitors: Linklaters & Paines, 2, Bond Court, Walbrook, E.C.2.

L. T. Phipps, Ltd.—Private company. Registered October 3rd. Capital, £2,000. Objects: To acquire the business of an electrical and radio dealer and engineer carried on by L. T. Phipps, at 6, Bridge Street, Evesham, Worcs. The permanent directors are: L. T. Phipps, Carsmore, Cheltenham Road, Evesham, Worcs, and S. F. O. Lidington, 44, Albert Road, Evesham, Worcs. Remuneration as fixed by the company.

C. H. Williams & Co., Ltd.—Private company. Registered October 3rd. Capital, £300. Objects: To carry on the business of electrical engineers and general electrical installation contractors, lighting specialists and contractors, wireless engineers, refrigerating and cold storage engineers, &c. The directors are: C. H. Williams, 19, Prospect Mount Road, Scarborough, and H. S. Goldsborough, 4, Cornelian Drive, Scarborough. Solicitor: Thomas Holtby, Great Driffield, Yorks.

Davis Electrical and Radio Accessories, Ltd.—Private company. Registered September 14th. Capital, £100. Objects: To carry on the business of agents, factors and merchants of electrical fittings and appliances of all kinds, &c. The directors are: S. Felkoff, 44, Heathland Road, N.16, and J. Davis, 7, Forty Lane, Wembley Park, Middlesex. Registered office: 80, Bishopsgate, E.C.2.

Durham Cables, Ltd.—Private company. Registered October 3rd. Capital, £30,000. Objects: To carry on the business of manufacturers of and dealers in electric cables, wires, ropes, belts, cords, conductors, engines, dynamos, &c. The directors are: W. C. Hay, address not stated. N. Dawson, "Brackenber," Whickham, Co. Durham, H. C. Harrison, address not stated, and Wm. A. Wood, Dalton House, Dalton, Northumberland. Solicitors: Wilkinson & Marshall, 1, Mosley Street, Newcastle-on-Tyne.

B. & M. Sexton, Ltd.—Private company. Registered September 14th. Capital, £1,000. Objects: To acquire the business of radio, electrical and cycle dealers now carried on by Basil V. Sexton and Mabel E. Sexton, as "B. & M. Sexton." The permanent directors are: B. V. Sexton, and M. E. Sexton, both of 47, Bellevue Road, Southampton. Registered office: 45, Bellevue Road, Southampton.

Gaillard, Robinson & Co., Ltd.—Private company. Registered October 1st. Capital, £2,000. Objects: To carry on the business of electrical, mechanical and general engineers, &c. The subscribers are: D. J. Gaillard, 1, Burlington Road, New Malden, Surrey; and L. W. Moritz, 3, Newland Avenue, Thames Ditton. D. J. Gaillard is first director.

Harold E. White, Ltd.—Private company. Registered September 28th. Capital, £500 in 500 shares of £1 each. Objects: To acquire the business of an electrical and radio engineer carried on by H. E. White at 27, Marylebone Lane, W.1. The directors are: H. E. White, Mrs. F. A. White and R. A. White, all of 27, Marylebone Lane, W.1.

W. H. Armytage, Ltd.—Private company. Registered September 28th. Capital, £2,000. Objects: To carry on the business of manufacturers of and dealers in electric plant, motors, armatures, contacts, insulators and insulating material, fires, stoves, &c. The directors are: W. H. Armytage and Harold H. Armytage, both of 36, Marlborough Road, Bradford. Secretary: H. H. Armytage. Registered office: 26, Aldermanbury, Bradford.

Central Radio and Television, Ltd.—Private company. Registered September 29th. Capital, £1,000. Objects: To carry on the business of mechanical, electrical, radio and television engineers, &c. The subscribers are: M. Goodman and S. Goodman, both of 21, Forburg Road, N.16. M. Goodman is the first director. Registered office: 21, Forburg Road, N.16.

Electrical Power Maintenance Service, Ltd.—Private company. Registered September 29th. Capital, £1,000. Objects: To acquire the business now carried on by J. Hassall at 91, Macdonald Street, Birmingham, as the Electrical Power Maintenance Service Co., and to carry on the business of electrical and mechanical engineers, and electrical wiring contractors, &c. The subscribers are: J. Hassall, 91, Macdonald Road, Birmingham, 5; and W. M. Thompson, 82, Oxford Road, Moseley, Birmingham 13. J. Hassall is to be permanent governing director so long as he holds 500 shares. Registered office: 70, Lower Essex Street, Birmingham.

Returns of Electrical Companies

Laurence, Scott & Electromotors, Ltd.—The nominal capital has been increased by the addition of £150,000 beyond the registered capital of £310,995. The additional capital is divided into 100,000 5 per cent. cumulative redeemable preference shares of £1 and 200,000 "A" ordinary shares of 5s. each. 30,000 of the ordinary shares of £1 in the original capital have been subdivided into 120,000 "A" ordinary shares of 5s. each.

Fractional H.P. Motors, Ltd.—The nominal capital has been increased by the addition of £2,000 in £1 ordinary shares beyond the registered capital of £2,000.

Fourwave, Ltd.—The nominal capital has been increased by the addition of £2,500 beyond the registered capital of £2,500. The additional capital is divided into 2,500 5 per cent. non-cumulative preference shares of £1.

Amps, Ltd.—G. W. Bannister, of 19, Belltrees Grove, Streatham, S.W.16, ceased to act as receiver on September 28th, 1936.

Power Utility Supply Co., Ltd.—The nominal capital has been increased by the addition of £500 in £1 ordinary shares beyond the registered capital of £500.

De Renzi Holmes & Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated September 11th, 1936, to secure £200. Holder: D. E. Campbell, 79, Dichfield Street, Wolverhampton.

Oxford Electric Co., Ltd.—Capital, £350,000 in 150,000 6 per cent. cumulative preference and 200,000 ordinary shares of £1. Return dated April 10th, 1936. All shares taken up. £316,000 paid on 150,000 preference and 166,000 ordinary shares. £34,000 considered as paid on 34,000 ordinary shares. Mortgages and charges, nil.

Automatic Electrical Refrigerators, Ltd.—Capital, £5,000 in 4,985 cumulative preference shares of £1 and 300 founders' shares of 1s. Return dated August 14th, 1936. 3,700 preference and 300 founders' shares taken up. £3,718 paid. Mortgages and charges, nil.

Babcock & Wilcox, Ltd.—Capital, £4,620,000 in 100,000 6 per cent. preference, 200,000 5 per cent. second preference, and 4,320,000 ordinary shares of £1 each. Return dated May 18th, 1936. 100,000 6 per cent. preference, 179,056 second preference, and 4,299,656 ordinary shares taken up. £1,029,884 paid on 179,056 second preference and 850,828 ordinary. £3,548,828 considered as paid on 100,000 6 per cent. preference and 3,448,828 ordinary. Mortgages and charges, nil.

Bideford and District Electric Supply Co., Ltd.—Capital, £140,000 in £1 shares. Return dated May 15th, 1936. 130,000 shares taken up. £118,400 paid. £11,600 considered as paid. Mortgages and charges, £4,271 17s. 8d. (bank overdraft).

Holsworthy Electric Supply Co., Ltd.—Satisfaction in full on September 21st, 1936, of (a) mortgage dated March 11th, 1910, and registered March 16th, 1910, collaterally securing £1,000; (b) of debenture dated March 11, 1910, and registered March 16th, 1910, securing £1,000; (c) of debenture dated January 27th, 1912, and registered February 2nd, 1912, securing £500; and (d) of

mortgage dated January 27th, 1912, and registered February 2nd, 1912, collaterally securing £500; on June 15th, 1936, of £500 (balance having been cancelled), of a series of £750 "B" mortgage debentures, dated July 22nd, 1916, and registered August 10th, 1916; and on May 14th, 1934, of £2,000 "C" debentures dated December 20th, 1923, and registered December 31st, 1923.

L. E. Wilson & Co., Ltd.—Capital, £2,000 in £1 shares. Return dated May 22nd, 1936. 1,601 shares taken up. £1,601 paid. Mortgages and charges nil.

Wycombe (Borough) Electric Light & Power Co., Ltd.—Capital, £200,000 in 175,000 ordinary and 25,000 preference shares of £1. Return dated May 1st, 1936. 175,000 ordinary and 15,000 preference shares taken up. £172,000 paid on 157,000 ordinary and 15,000 preference shares, £18,000 considered as paid on 18,000 ordinary shares. Mortgages and charges: £40,000.

Alert Electrical Co., Ltd.—Capital, £2,000 in £1 shares. Return dated May 21st, 1936. 711 shares taken up. £711 paid. Mortgages and charges nil.

New System Private Telephones, Ltd.—Capital, £20,000 in £1 shares. Return dated June 8th, 1936. All shares taken up. £33,000 paid (including premium of £3 per share on 5,000 shares), £2,000 considered as paid on 2,000 shares. Mortgages and charges nil.

John Davis & Son (Derby), Ltd.—Capital, £35,000 in 22,500 ordinary and 12,500 unclassified shares of £1. Return dated June 4th, 1936. 22,500 ordinary shares taken up. £15,000 paid, £7,500 considered as paid. Mortgages and charges nil.

Northern Crystal Twinlight Co., Ltd.—Agreement charged on the company's undertaking and property, present and future, including uncalled capital, dated September 23rd, 1936, to secure £300. Holder: J. Neesham, 3, Dene Road, Tynemouth.

City Notes

The Brush Electrical Engineering Co., Ltd., held its annual meeting recently when Mr. H. E. Midgley (acting chairman), who presided, after explaining the circumstances which had caused the recent changes in the directorate and administration of the company, said that their works were better equipped and functioning more efficiently than for some time past. The trade of the rolling stock and transformer departments was reasonably satisfactory; either of these was capable of operating on its own at a profit and of carrying its share of overhead expenses, and they should continue to progress. The position of the heavy engineering side, in which the major part of the capital was employed and which required the heaviest overhead expenditure, was not so satisfactory. This department, until the order for the Brighton turbo-generator sets was obtained, had been short of turnover and was unable to contribute towards the overhead expenses. However, when the expected success of the Brighton sets was achieved, there were prospects of further orders for similar sets being obtained and that the department would once again contribute profits. With the extension of the grid more medium-sized sets might be required than in the past few years and they were in a position to supply a portion of this demand. It was also hoped that they would obtain a share of the general engineering work which the present armament programme would demand. Even under the most favourable conditions, however, they could not expect to do better than break somewhere near even for 1937. The large turbines for Fulham and Watford had been installed and other orders completed during the year, while sixteen Diesel engines for the Blue Star line had been completed. Orders for Diesel engines showed an increase over last year, and had been secured at a higher level of prices. In the transformer section they had held their own against keen competition at home and abroad, but it was obvious that more orders must be attracted to occupy this department sufficiently. With regard to the rolling stock an order for the London Passenger Transport Board had been completed, and a repeat contract for fifty large trolley-buses secured.

The Cawnpore Electric Supply Corporation is issuing £300,000 4½ per cent. first mortgage debenture stock at 102. The company's £132,080 of 5 per cent. (tax free) debentures are being repaid at 102 in June, 1937, and holders have the right to convert into an equal amount of the new issue. Shareholders may apply for any stock not required for exchange purposes. The balance of the issue will be applied towards extensions and purchase of plant to meet the growing demand and for the general purposes of the company. This issue, which is being made with the consent of the Government of the United Provinces of India, has been underwritten by the Beaver Trust.

The London Passenger Transport Board is paying a final interest payment of 2½ per cent., less tax, on the "C" stock, making the year's distribution 4 per cent., the same as for the previous year. The Board announces that the whole of the consideration for undertakings transferred to or acquired by it under the Act of 1933 has now been ascertained. The balances for the years ended June 30th, 1934 and 1935 of the "interest suspense accounts" amount to £28,632, and do not permit of any further interest on the "C" stock for these years. They have, therefore, been transferred to the "C" stock interest fund and are included in the revenue available for appropriation for the year to June 30th, 1936.

Max Stone, Ltd.—The first annual meeting was held on September 30th, when Mr. S. Walton, who presided, said that they had formed a private company, the whole capital of which they owned, to finance hire-purchase business. They were in an excellent position to finance the opening of further stores. By Christmas they expected to have a series of at least fifty stores in full activity. At each of the stores the range of radio sets and radiograms extended upwards from two guineas to one hundred guineas. A considerable part of their turnover was in the sale not only of radio equipment but also of electrical appliances of every kind for the home, and the sales were mounting in that section of their business.

The British Power & Light Corporation, Ltd.—An extraordinary meeting was held on October 1st at which a resolution was approved for converting 339,384 issued and fully paid ordinary £1 shares into ordinary stock. Mr G. W. Partridge, who presided, said that only 5,263 of the shares offered to stockholders in April last had been left over, and the directors had offered to the employés of the Corporation and its subsidiary companies the shares so left over on the same terms as the offer to stockholders and all of them were duly subscribed for.

The Westinghouse Brake & Signal Co.—The *Financial Times* reports that a European financial group has purchased a block of 200,000 £1 shares of this company from the Westinghouse International Brake & Signal Co. of America. The American company's holding was about 40 per cent. of the English company's capital, or between 350,000 and 380,000 shares. It has decided to sell the block of 200,000 shares because it requires funds to finance its own expansion and because it feels that the European business should be left in the hands of European interests.

Stewarts & Lloyds, Ltd., are offering to holders of deferred stock and liaison deferred shares the whole of the unissued deferred shares of £1 each. They total 1,042,910 and will be offered at 26s. each in the proportion of one for every £5 of stock held, each liaison deferred share ranking as equal to £1,000 of deferred stock. The new shares will be converted into stock and will rank *pari passu* with the existing deferred stock as from January 1st, 1937.

Joseph Lucas, Ltd., reports a net profit for the year ended August 7th last of £318,142, as compared with £263,668 in the previous year, which with £74,377 brought in makes £392,519. Reserve receives £75,000, and the workpeople's funds £15,000. The final ordinary dividend is 12½ per cent., making 15 per cent. for the year, less tax (against 12½ per cent.), and £67,628 is carried forward. Meeting: October 27th, in Birmingham.

Herbert Morris, Ltd., report a profit for the year ended July 31st last of £119,505, as compared with £70,265 for the preceding year. It is proposed to pay a final ordinary dividend of 12½ per cent. free of tax, on the 800,000 shares of 10s. each, making 17½ per cent. for the year, and to place £10,000 to reserve, leaving £39,313 to be carried forward.

Ruston & Hornsby, Ltd., have given notice of their intention to redeem on April 1st, 1937 the outstanding £60,000 5½ per cent. mortgage debenture stock at 110 per cent. Payment will be made plus accrued interest (less tax) from January 1st, 1937, on which date the usual half-yearly interest will be paid.

Associated Electrical Industries, Ltd., proposes that all of the ordinary and preference shares issued and paid up but not converted into stock shall be converted into stock forthwith, and an extraordinary meeting to approve the plan will be held on October 12th.

The International Automatic Telephone Co., Ltd.—At an extraordinary meeting held on October 1st a resolution was passed changing the name of the company to Automatic Telephone & Electric Co., Ltd.

Thomas De La Rue & Co. announce that they are about to make an offer of shares on bonus terms to shareholders.

Stocks and Shares

Tuesday Evening.

THE clearer financial atmosphere that has become apparent through the strong expectation of currency stabilisation being established throughout the principal countries of the world, is responsible for the better showing made by prices, and also for a material increase in the volume of Stock Exchange business. On the Monday of this present week, the activity and animation in most of the markets round the Stock Exchange kept members too busy even to discuss the reasons for the rises, and the prospects for their continuance.

To illustrate the condition of affairs in the Stock Exchange itself, mention may be made of the large frames of electric indicators, divided into small sections containing numbers, that are placed high on the walls round the House. A number is allocated to the Stock Exchange firm or member that cares to have it. On Monday last, these frames were 75 per cent. illuminated throughout the day, while the traffic on the telephone and telegraph wires must have broken a number of past records. The receipts for telephone calls in the Stock Exchange on one day this week were about £400.

Gilt-edged Securities

Prices in the gilt-edged market are appreciably higher now than they were a fortnight ago, before the French currency devaluation. Precautionary marking down of British Government stock-prices, against the possibility of a large-scale repatriation of French "refugee" money, proved to be unnecessary. The ever-present weight of investment money quickly swung the scales back to, or above normal. It appears that, until France's internal affairs are restored to better order, there is little likelihood of French money leaving these shores in sufficient volume to threaten the success of the British Treasury's cheap-money policy.

Central Electricity stocks, and others in the same category, remain undisturbed by the period of uncertainty. It is worth remarking that the price of London Passenger Transport "A" 4½ per cent. stock has risen, in a month, from 122½ to 126¼. The "B" stock stands a point higher than it did a week ago.

Transport "C" Stock

The London Passenger Transport Board has declared a final interest payment on the "C" stock of 2½ per cent., bringing the total distribution for the year ended last June to 4 per cent. again. A fall of 1½ points in the price of the stock, to 103, ex-interest, shows that some people had hoped for something nearer to the "standard" rate of 5½ per cent., although optimism in that direction had been discouraged, at the time

of the interim payment, by an official warning of higher working expenses. The increase in gross receipts during the past year amounted, in itself, to quite a respectable figure: the £380,000 thus gained represents approximately 1½ per cent. on the "C" capital. How far extra costs have eaten into this amount will be known when the full accounts are published near the end of the month. The market does not expect the net figure to differ very much, either way, from that of last year. This year's extremes of prices are 112 and 101.

Electrical Equipment Shares

Another sharp rise in the price of Ericsson Telephones is the chief point of interest in the market for electrical equipment issues. The price of Ericssons has crossed the £3 mark, having capped a rise of 3s. 9d. in the previous week with another of the same amount. The yield on the 5s. units is a mere 1.6 per cent., free of tax, calculated on last year's dividend: nearness of the current year's interim dividend announcement has much to do with present activity. In the same group, Telephone Manufacturing and Telephone Rentals are both easier, at 11s. and 10s. 9d. respectively.

Crompton Parkinsons are good at 4¼, and General Electrics show a shilling gain. Siemens reacted from 32s. 6d. to 31s. 3d. British Aluminium shed a further 1s. to £2, and Enfield Rolling Mills at 9d. to 22s. 3d. Laurence, Scott & Electromotors "A" ordinary are very steady around 10s. 3d. Firm spots in the market are Allen Wests at 8s. 3d., and Switchgear and Cowans at 17s. Brush Electrical stock, at 37½, has started to recover from the disappointment caused by the recent report. The chairman's speech at the annual meeting was in a vein of chastened hopefulness.

Brazilian Traction, Light and Power

Brazilian Traction ordinary shares are taking a prominent part in the all-round recovery of South American securities. Based on encouraging reports of internal business conditions, the movement had already gained some momentum before the stimulus of the French currency agreement was added. Exchange losses resulting from the transfer of funds to hands outside the country have long been a thorn in the side of "foreign" proprietors of capital invested in South America. British and other investors now have better reason to hope that, thanks to the efforts being made towards a world-wide lessening of exchange difficulties, there will be something tangible to show for South American recovery.

Shareholders in the Brazilian Traction company have already received, this year, some such tangible evidence, in the form of a 30 cent. per share dividend. This was the first cash payment to be made since 1932, although the accounts for 1935 showed surplus revenue equivalent to nearly 74 cents on the ordinary shares. The present price of $16⅜ for the shares, which are of no par value, compares with $12¾ a few days before the fall of the franc. Hydro Electrics and International Holdings also show substantial gains, at 9⅜ and 2 5/16 respectively: both companies have a big stake in the Brazilian Traction Company.

South American Debentures

A yield of 5.4 per cent. can be obtained from the 5 per cent. 40 year first mortgage bonds of Jardim Botanico Tramway, a company which forms part of the Brazilian Traction Light and Power company's system. The latter company provides, indirectly through the Rio de Janeiro Tramway company, the interest and sinking fund charges, which are payable in sterling. Profits of Brazilian Traction in 1935 covered these charges approximately eight times over. The bonds are redeemable by 1951 by purchase up to, or by drawings at 102½ by means of a ¼ per cent. sinking fund, which is now in operation. The bonds are on offer, at the moment, at 92. For the reasons mentioned in the previous paragraph, and having regard to the eminence of the sponsors, the bond holds attractions for those looking, outside the list of purely safety stocks, for a comparatively high-yielding investment.

Telegraphs and Telephones

The prospect, opened up by the three-sided currency agreement, of freer intercourse between nations, has naturally stimulated interest in communication stocks. Firmness in Cable and Wireless issues is maintained, the preference and "B" ordinary showing modest gains on the week, and the "A" having lost none of last week's sharp rise. Among the dollar stocks, American Telegraph and Telephone gained a further 2 points to 179½, Internationals ⅛ to 13¼, and Western Unions 2 to 91. Elsewhere, Canadian Marconis show a ninepenny rise to 8s., and Anglo-Portuguese Telephones are 1s. up at 26s. 6d.

Miscellaneous Matters

British Electric Traction deferred stock has scored a century with a rise of 100 points to 1625. The preferred followed much more sedately with a gain of a modest £2 to 179¼. Anglo-Argentine Tramways 5 p.c. debenture at 9⅛ has all but doubled in price since a week ago. Amongst the stocks and shares in the domestic "heavy" group, Babcock & Wilcox have rallied to 51s., being 1s. up. Other iron and steel shares are generally higher. The television issues remain quiescent. Rubber shares are, in the language of a jobber in their market, straining at the leash in an effort to participate in the buoyancy of other industrials. So far, the effort has not met with pronounced success.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. Previous.	Dividend. Last.	Price. Oct. 6.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6	—	3 17 5
City of London	1	7½	7½	37/–	—	4 1 1
Clyde Valley	1	7	8	47/–	—	3 8 1
County of London	1	10½	10½	55/–	—	3 16 4
Edmundson's 7% Pref.	1	7	7	35/6	—	3 19 0
Do. Ord.	1	8	8	45/–	—	3 11 0
Elec. Dis. Yorkshire	1	9	9	48/–	—	3 15 0
Elec. Fin. and Securities	1	12½	12½	3½	—	4 0 0
Elec. Supply Corporation	1	11	11	60/9	—	3 12 4
Lancs Light and Power	1	7½	7½	38/–	—	3 19 0
Lond. Assoc. Electric	1	—	7	35/–	—	4 0 0
London Electric	1	7	8	39/6	—	4 1 1
London Power Deb. Red.	Stock	5	5	107½	—	4 13 4
Metropolitan	1	10	10	51/6	+6d.	3 17 8
Midland Counties	1	7	7½	41/6	—	3 12 2
Mid. Elec. Power	1	8	8	45/- xd.	+6d.	3 11 1
North Eastern Electric Ordinary	1	6	6	35/6	—	3 7 7
Do. 7% Pref.	1	7	7	36/6	+6d.	3 16 9
Northampton	1	10	10	51/3	—	3 18 2
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 3
North Met. Elec. Ordinary	1	10	10	58/3	—	3 8 7
Do. do. 6% Pref.	1	6	6	32/6	—	3 13 10
Scottish Power	1	8	8	42/–	—	3 16 2
South London	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	23/–	+1/–	6 10 4
Yorkshire Elec.	1	8	8	44/–	—	3 12 9

PUBLIC BOARDS.

Central Electricity, 1960–70	Stock		5	116½	—	4 5 9
Do. 1955–75	„	5	5	118½	—	4 4 4
Do. 1951–73	„	4½	4½	111½	—	4 0 9
Do. 1963–93	„	—	3½	104	—	3 7 4
London Elec. Trans. Gtd.	„	—	2½	96	—	2 12 1
London & Home Counties, 1955–75	„	4½	4½	114	—	3 19 0
London Passenger Transport, A	„	—	4½	126½	—	3 11 2
Do. do B	„	—	5	129½	+1	3 17 3
Do. do C	„	3½	4	103xd.	–1½	3 17 8
West Midlands Joint Elec. 1948–68	„	—	5	115½	—	4 6 7

TELEGRAPH AND TELEPHONE.

American Tel. & Tel.	$100	9	9	179½	+2	5 0 10
Anglo-Am. Tel. Pref.	Stock	6	6	128½	—	4 13 5
Do. Def.	„	1½	1½	32	—	4 13 9
Cable & Wireless 5½% Pref.	„	4½	5½	102	+½	5 7 10
Do. A. 7½% Ord.	„	Nil	Nil	22	—	—
Do. B. Ord.	„	Nil	Nil	6½	+½	—
Globe Tel. & Tel. Ord.	10	3½*	4½*	13⅞	—	3 4 10
Do. Do. Pref.	10	6	6	14½	—	4 4 3
Great Northern Tel.	10	20	20	42½	—	4 14 1
Marconi-Marine	1	10	7½	36/3	—	4 2 9
Oriental Telephone Ord.	1	12*	12*	3½	—	3 13 10

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/9	+9d.	—
Do. do. 2nd Pref.	5	Nil	Nil	9d.	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	9½	+4½	—
British Electric Traction Df. Ord.	„	5	5	1625	+100	—
Do. do. Pref. Ord.	„	8	8	179½	+2	4 9 2
Brazil Traction	100	—	30 cts	16⅜	+2⅛	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	104½	—	4 15 8
Mexican Light Common	100	Nil	Nil	2½	–1	—
Do. 1st Bonds	$500	5	5	45	—	—
Victoria Falls Ord.	1	20	12	3 12	—	3 3 0
West Riding	1	5	6½	50/–	—	2 12 9

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	15	66/9	—	4 14 1
Assoc. Elec. Ord.	1	6	8	52/0	—	3 1 6
Do. Pref.	1	8	8	39/6	—	4 1 0
Babcock & Wilcox	1	8	8	53/9	+ 3/8	2 19 6
British Aluminium Ord.	1	7½	7½	2	–1/–	3 13 2
British Insulated Ord.	1	15	20	5½	—	3 11 2
Brush Ord.	Stock	Nil	Nil	37½	+2½	—
Callender's	1	15	15	4 3/8	—	3 5 8
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/–	—	12½	4½	+½	—
Do. 8% Pref.	1	8	8	2	—	4 0 0
Edison Swan 1st Pref.	1	7½	7½	30/–	—	5 0 0
Electric Construction	1	3½	7	40/–	—	3 10 0
Enfield Cable Ord.	1	25	25	5 3/8	—	4 7 0
English Electric	1	Nil	Nil	27/–	—	—
Do. Do. Pref.	1	Nil.	Nil	27/6	—	—
Ericsson Tel.	5/–	24	20*	3 3/8	+ 3/8	1 12 9
Ever Ready	5/–	35	35	27/3	—	6 8 8
Ferranti Pref.	1	7	7	28/9	—	4 17 5
G.E.C. Pref.	1	6½	6½	35/–	—	3 14 4
Do. Ord.	1	10	15	92/–	+1/–	3 5 3
Henleys	1	30	30	7½	—	4 1 4
Do. 4½% Pref.	5	4½	4½	5½	—	3 18 3
India-Rubber Preferred	1	—	5½	1¼xd.	+6d.	4 17 9
Johnson & Phillips	1	7½	10	52/–	—	3 16 9
Lancashire Dynamo	1	5	10	3	—	3 6 8
Siemens Ord.	1	4	6	31/3	– 1/8	3 16 10
Telegraph Construction	£1	Nil	Nil	33/9	—	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be numbered and abridged and all subsequent proceedings will be taken.

1934

35313. "Cathode-ray tubes, preferably for television purposes." Radioakt.-Ges. D. S. Loewe. December 9th, 1933. (453223.)

1935

3399. "Electromagnetically operated mercury switches." A. Cianchi. February 1st, 1935. (453229.)

3611. "Electron-discharge devices." Telefunken Ges. für Drahtlose Telegraphie. February 2nd, 1934. (453421.)

4120. "Watertight jackets and sheaths of electric cables." Siemens-Schuckertwerke Akt.-Ges. February 8th, 1934. (453481.)

4277. "Electric motor control systems." T. Clark and I. Vlasto. February 11th, 1935. (453350.)

6751. "Control of rectifier plants." British Thomson-Houston Co., Ltd. March 2nd, 1934. (Addition to 418633.) (453352.)

6896. "Electric ovens." Igranic Electric Co., Ltd., and S. R. Wright. March 5th, 1935. (453354.)

6938. Method of arranging current conductors on electrical insulating panels and improved panel." F. J. W. Jansen. March 5th, 1935. (453428.)

6983. "Electric signalling devices." W. C. Davey. March 6th, 1935. (Cognate application 34664/35.) (453355.)

7174. "Wireless receiving systems." A. C. Cossor, Ltd., L. H. Bedford and O. S. Puckle. March 7th, 1935. (453484.)

7284. "Multi-conductor electric cables." W. W. Triggs (Felten and Guilleaume Carlswerk Akt.-Ges.) March 8th, 1935. (453485.)

7294. "Electric meters." Standard Telephones & Cables, Ltd., and R. E. Herrick. March 8th, 1935. (453279.)

7334. "Electrical conductors." V.G. Manufacturing Co., Ltd., and F. M. Van Gelderen. March 8th, 1935. (453486.)

7401. "Time-lag electric relays." A. Reyrolle & Co., Ltd., and J. A. W. Mills. March 9th, 1935. (453358.)

7459. "Electrical coupling devices." B. Lee and F. P. Bevis. March 9th, 1935. (453360.)

7536. "Cathode-ray tubes for use, for example, in television." General Electric Co., Ltd., and G. W. Seager. March 11th, 1935. (453496.)

7566. "Television and like receivers." Marconi's Wireless Telegraph Co., Ltd., and A. A. Linsell. March 11th, 1935. (453499.)

7568. "Piezo-electric crystal arrangements." Marconi's Wireless Telegraph Co., Ltd., and G. F. Brett. March 11th, 1935. (453500.)

7570. "Modulated carrier-wave transmitters." Marconi's Wireless Telegraph Co., Ltd., and W. T. Ditcham. March 11th, 1935. (453501.)

7580. "Coin-freed prepayment mechanism." British Electric Meters, Ltd., and R. T. Brown. March 11th, 1935. (453503.)

7719. "Submarine pressure-wave transmitting and receiving apparatus." Marconi International Marine Communication Co., Ltd., and N. P. Hinton. March 12th, 1935. (453512.)

7802. "Method and apparatus for the treatment of alkali-metal amalgam obtained in electrolytic cells having mercury cathodes." Soc. Anon. Krebs & Co. March 13th, 1934. (453517.)

7817. "Heater elements of electrodes in electric-discharge devices." British Thomson-Houston Co., Ltd., H. de B. Knight and F. T. Shepherd. March 13th, 1935. (453519.)

7896. "Electric protective arrangements." A. Reyrolle & Co., Ltd., and H. Leyburn. March 14th, 1935. (453525.)

7962. "Control mechanism for electrically driven trawl winches." W. H. Scott and H. O. Clark. March 14th, 1935. (453361.)

7979. "Electric contacts." J. Lucas, Ltd., and O. Lucas. March 14th, 1935. (453533.)

8018. "Transmission mechanism for remote control of electric switchgear, aeroplane controls and other apparatus." W. Overton. March 15th, 1935. (453579.)

8275. "Artificial lines for use on radio and other high frequencies." Marconi's Wireless Telegraph Co., Ltd., J. D. Brailsford and R. F. O'Neill. March 16th, 1935. (453538.)

8420. "Carrier current telephone systems." A. C. Timmis, A. J. Aldridge and E. J. Barnes. March 18th, 1935. (453444.)

8457. "Automatic telephone systems." Panstwowe Zaklady Tele-Iradjotechniczne W. Warszawie and J. Jedrychowski. March 18th, 1935. (453540.)

9325. "Thermostatically operated safety devices for electrically heated appliances." G. H. Collins, H. F. Collins and A. E. Newton. March 26th, 1935. (453363.)

10743. "Electric circuit arrangements for supplying luminous electric-discharge devices." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen). April 6th, 1935. (453446.)

10999. "Electric-discharge devices." Ferranti, Ltd., M. K. Taylor and R. W. Sutton. April 9th, 1935. (453286.)

12633. "Sealing chambers for electric cables." W. T. Henley's Telegraph Works Co., Ltd., and E. Moor. April 27th, 1935. (453236.)

13711. "Direct electric current motor equipments." W. T. Gray and Metropolitan-Vickers Electrical Co., Ltd. May 9th, 1935. (453369.)

14725. "Electrical regulating switching arrangements." General Electric Co., Ltd., H. L. Bentley and A. R. Wood. May 20th, 1935. (453453.)

15096. "Electric-discharge devices." General Electric Co., Ltd., and W. R. Stevens. May 23rd, 1935. (453295.)

16185. "Electric junction boxes." H. R. A. Reed. June 4th, 1935. (453456.)

16915. "Metal-clad draw-out electric switchgear." A. Reyrolle & Co., Ltd., F. Coates and J. Christie. June 12th, 1935. (453298.)

18062. "Braking arrangements for compound-wound electric traction motors." General Electric Co., Ltd., and E. H. Croft. June 24th, 1935. (453241.)

18323. "Control apparatus operated by relays constituted by tuned vibrating blades." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. November 15th, 1934. (453242.)

18560. "Telephone systems." Inter-Outer Telephone Corporation. July 5th, 1934. (453459.)

18948. "Very high frequency (micro-wave) signalling systems and apparatus." Marconi's Wireless Telegraph Co., Ltd. July 2nd, 1934. (453243.)

19223. "Method of and apparatus for manufacturing coated insulated wires." Zaidan Hojin Rikagaku Kenkyujo. July 19th, 1934. (453377.)

19660. "Method and arrangement for producing regulating biases." Radioakt.-Ges. D. S. Loewe. December 6th, 1933. (Divided out of 34895/34.) (453463.)

21650. "Arrangements for making test measurements of alternating currents." Siemens & Halske Akt.-Ges. July 30th, 1934. (453245.)

22576. "Electric-discharge devices." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen). August 9th, 1935. (453465.)

24066. "Thermionic valve amplifiers." General Electric Co., Ltd., and L. I. Farren. August 28th, 1935. (453246.)

24182. "Sources of light." W. J. Tennant (Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares, Etablissements Claude-Paz & Silva). August 29th, 1935. (453310.)

25706. "Light valves for recording sound." S. S. Hansen and T. M. E. Wendt. October 22nd, 1934. (453247.)

26720. "Electro bus-bar device for the ignition systems of internal combustion engines." G. & J. Weir, Ltd., and C. G. Pullin. September 27th, 1935. (453467.)

27190. "Electric circuit interrupters." Westinghouse Electric & Manufacturing Co. October 11th, 1934. (453468.)

28145. "Speed-changing arrangements for three-phase shunt-wound electric motors." Siemens-Schuckertwerke Akt.-Ges. November 14th, 1934. (453311.)

28357. "Electrical circuits employing cathode-ray tubes." Compagnie pour la Fabrication des Compteurs et Matérial d'Usines a Gaz. October 12th, 1934. (Cognate applications 28358/35 and 28359/35.) (453248.)

31594. "Telegraph signalling systems." Soc. d'Etudes pour Liaisons Téléphoniques et Télégraphiques à Longue Distance. November 15th, 1934. (453254.)

32195. "Sources of light." W. J. Tennant (Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares, Etablissements Claude-Paz & Silva). November 20th, 1935. (Addition to 453310.) (453316.)

32403. "Electric-discharge tube." Egyesult Izzolampa es Villamossagi Reszyvenetarsasag. November 22nd, 1934. (453549.)

34667. "Protective sheathings for electric cables." British Thomson-Houston Co., Ltd. December 13th, 1934. (Addition to 453015.) (453397.)

34868. "Apparatus for producing mechanical vibrations by electrical means." Naamlooze Vennootschap Machinerieen en Apparaten Fabrieken Meaf. December 29th, 1934. (453256.)

35599. "Inductance coils or transformers having a core made of moulded insulated magnetic particles." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 14th, 1935. (453257.)

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2296. "Thermionic amplifiers." Standard Telephones & Cables, Ltd., and L. J. Heaton Armstrong. January 24th, 1936. (453400.)

3489. "Distribution fittings or couplings for electric circuits." United-Carr Fastener Corporation. February 6th, 1935. (453558.)

4433. "Circuit arrangements for suppressing disturbances in wireless receiving sets." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 13th, 1935. (453261.)

5556. "Permanent magnets for electricity meters, measuring and other apparatus." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. February 22nd, 1935. (453262.)

5913. "Electron-discharge device circuit arrangements." Marconi's Wireless Telegraph Co., Ltd. February 27th, 1935. (453562.)

7542. "Process in manufacturing of malleable insulator heads and the like with a hollow top dome for high-tension electric mains." C. G. Neck. May 10th, 1935. (453476.)

7818. "Compression refrigerating machine with electromotor." Berlin-Suhler Waffen-und Fahrzeugwerke Ges. March 22nd, 1935. (453337.)

8368. "Electric-discharge tube with sprung cathode." Egyesult Issolampa es Villamossagi Reszyvenetarsasag. March 20th, 1935. (Addition to 453549.) (453564.)

9009. "Electric transmission systems." C. Lorenz Akt.-Ges. April 6th, 1935. (453566.)

9712. "Electric incandescent lamps." E. W. Bolloten. April 2nd, 1936. (453341.)

11708. "Portable electric lamps." W. Maurice and Wolf Safety Lamp (Hiring) Co., Ltd. April 24th, 1936. (453268.)

12503. "High-frequency generating systems." British Thomson-Houston Co., Ltd. May 3rd, 1935. (453570.)

14195. "Electrical impulse responsive devices." Bristol's Instrument Co., Ltd. (Bristol Co.). May 19th, 1936. (453571.)

15401. "Valve amplifiers of electrical signals." Siemens & Halske Akt.-Ges. June 18th, 1935. (453574.)

19201. "Cathode-ray tubes, preferably for television purposes." Radioakt-Ges. D. S. Loewe. December 9th, 1933. (Divided out of 453223.) (453270.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 30th:—

Aerogen. No. 569879. All goods in Class 8.—The India Rubber, Gutta Percha and Telegraph Works, Ltd., Thames House, Millbank, Westminster, S.W.1.

I.M.R.C. (lettering and design). No. 570667. Class 8. Wireless signalling apparatus and parts thereof.—International Marine Radio Co., Ltd., Connaught House, 63, Aldwych, W.C.2.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aldershot.—Schools (400 places), for the R.C. managers; priest-in-charge.

Ashton-under-Lyne.—Church, Ripon Street, for the trustees of the Rehobeth Tabernacle; Alan Wych, architect, 1, Market Street, Denton, near Manchester.

Banbury.—Houses (134); borough surveyor.

Barking.—Central school, Manor site (£71,228); borough architect. Extensions to factory, Abbey Road; P. C. Henderson, Ltd. Extensions to factory, Alfred's Way; Dicky Bird, Ltd. Extensions to stores, Porters Avenue; Pearks Dairies, Ltd.

Barnsley.—Bus station, for the Yorkshire Traction Co., Ltd.; G. W. Robinson, general manager.

Bath.—Houses (34), Shophouse Road; borough engineer.

Belper.—Extensions to hosiery and underwear factory; George Brettle & Co., Ltd.

Billingham-on-Tees.—Houses (88); Kitching & Co., architects, Middlesbrough. Cinema on site of old Brewery House for the London owners (1,250 seats); W. T. Benslyn, architect, 17, Easy Row, Birmingham.

Bilston.—School buildings, Hall Park Street; Joynson Bros., architects, Buteroft, Darlaston.

Birmingham.—Babies block to the Children's Hospital, Ladywood Road, Edgbaston (£50,000) with electrical work; Martin, Martin & W. H. Ward, architects, 106, Colmore Row, Birmingham. Factory, Hunter Road, Hockley, for E. C. Edgar, Ltd. (£30,000) with electrical work; Whittall & Son, builders, Lancaster Street, Birmingham. Further additions to Redfern Road works, Tyseley, for Bakelite, Ltd., 68, Victoria Street, London, S.W.1; C. Bryant & Son, builders, Whitmore Road, Birmingham.

Bolton.—Extensions to mill, Wigan Road; Rayon Crepes, Ltd. Church, Longworth Street; St. Chad's Parochial Church Council. Houses (38), Wisbeck Road; Joseph Staton, Ltd.

Border (CUMBERLAND).—Houses (26); R.D.C. surveyor.

Bournemouth.—Secondary school, East Way; Education Committee.

Buckie.—Houses (20); T. Beattie, burgh surveyor, Town Hall.

Chelmsford.—Flats (30), Coval Lane area; J. C. Pryke.

Cheshire.—Senior school (320 places), Bebington-cum-Bromborough; director of education, Chester.

Chester.—Extensions to Salvatorian College, and new chapel; Willings, Ltd., builders, Liverpool.

Chippenham.—Secondary school; governors.

Cockfosters.—Houses (34), Gloucester Gardens; Alliston & Drew, 24, Woburn Square, London, W.C.1.

Colchester.—Senior school (£40,375), for City E.C.; F. Hutton & Son, builders.

Coseley.—Houses (46); J. C. Roper, clerk to the U.D.C., Council House.

Coventry.—Aero-engine factory, Aldermore Lane, for the Humber-Hillman Co. (£500,000) with electrical work; J. G. Gray, builders, Broad Street. Cinema, for A. W. Pell, Imperial Cinema, Earlesdon; G. Cave, architect, City Chambers, High Street.

Crewe.—Church, Minshull New Road, electrical work; Pennington, Hustler & Taylor, architects, Pontefract.

Croydon.—Flats and houses, Davidson Road estate (£24,965); G. Burgess, builder, Tolworth. Rebuilding and reconditioning South Norwood School (£27,500), St. Luke's School (£4,600), and Howard School (£4,300); Education Committee.

Dagenham.—Houses (320 acres site), for L.C.C. Public baths, with pavilion, main hall, café, &c., electrical work (£25,000); U.D.C. surveyor.

Derbyshire.—Senior schools, Alfreton (£23,600), and Bolsover; director of education, Derby.

Desborough.—Houses, Braybrook Road site, for the Housing Committee; C. D. Rochester, architect, 70, Rothwell Road.

Dover.—Two schools, Buckland & Shatterlocks; director of education.

Dundee.—Alterations to cinema, for the Stobswell Cinema Theatre, Ltd., Morgan Street.

Durham.—Extensions to Kibblesworth New Council school for E.C.; F. Willey, architect, 34, Old Elvet.

Eastbourne.—Houses (34), Lottbridge Drive (£12,491); Eames & Calverley.

Edinburgh.—Cinema, George district (£40,000); J. R. Poole, cinema proprietor.

Essex.—High School, Chingford (£43,100); county architect.

Eton.—Houses, Datchet and Stoke Poges; E. E. Slater, R.D.C. surveyor.

Feltham.—Houses (32), Baber Bridge estate; W. J. Bounds.

Finchley.—Council offices (£133,000); borough engineer.

Glasgow.—Extensions to Mitchell library (£65,000); city engineer. Homœpathic hospital (£250,000); the secretary.

Gloucester.—Extensions, including nurses' quarters and kitchen, Gloucestershire Royal Infirmary; Stamford Hutton, chairman of the Governors. Swimming bath and fire station for City Council.

Godstone (SURREY).—Houses (95), Coldshott estate; R.D.C. surveyor, Oxted.

Gravesend.—Houses (72), West Court estate; borough architect. Houses (61), Denton Court estate, Denton; Curtis & Fairburn.

Henley-in-Arden (WARWICKSHIRE).—Church, for the Baptist trustees; G. Coppage, builder.

Hindley (LANCASHIRE).—Cinema, Atherton Road, for Livesey & Ball.

Irish Free State.—(ARKLOW, Co. WICKLOW).—Houses (90); J. P. Caffrey, engineer and town surveyor, Courthouse. (PORTLAOIGHISE, Co. LEIX).—Factory, for the Irish Worsted Mills, Ltd.; T. J. Cullen, architect, 25, Suffolk Street, Dublin.

Keighley.—Houses, Arncliffe Road; Albert Sharp, Ltd.

Kent.—Secondary school, Milton Road, Gravesend; county architect.

Leatherhead.—Shops and cinema, Craddocks Avenue and Woodfield Lane; F. Harding Lowman.

Leicester.—Senior school, Tailby estate (£25,314) for E.C.

Leyland (LANCASHIRE).—Houses (64), near Bent Lane, for G. F. Boyce.

London.—(LEICESTER SQUARE).—Cinema, Alhambra site (£600,000); Odeon Theatres, Ltd.

Macclesfield.—Houses (400) between London Road and Maple Avenue; E. Hamson, borough surveyor, Town Hall.

Manchester.—Cinema, electrical work, Benehill, Wythenshawe, Northenden (£23,000); city surveyor. Flats, Wellington Street, Gorton (£35,912); city architect.

Mansfield.—Fire station and quarters (£16,900); borough surveyor.

Matlock.—Branch stores, Birchover, for the Derwent Valley Co-operative Stores, Ltd., Central Premises, Matlock; J. H. Shimwell, builders, Braemer Cottage, Youlgrave, near Bakewell.

Meriden.—Extensions to factory for Owen Thornell, Ltd., Balsall Common.

Merthyr Tydfil.—Houses (102); A. J. Marshall, borough engineer.

Midhurst (SUSSEX).—Houses (20); R.D.C. surveyor.

Morayshire.—School, Fochabers (£20,000), for Morayshire and Nairn E.C.; county master, of works, Elgin.

Newmarket.—Houses (32) and bungalows; A. E. Austin, R.D.C. surveyor, Park Lane.

Newport (I.o.W.).—County offices (£33,675); H. Stevens & Co., Ltd.

Norman Cross (HUNTS).—Houses (21), Oundle Road; Cosy Homesteads, Ltd.

North Riding.—Extensions, County School, Whitby; F. Barraclough, secretary, Education Offices, Northallerton.

Nottingham.—Elementary school, Mapperley (£19,933), for E.C.

Paignton.—Estate development of Windmill Lane; Torbay Proprietary, Ltd.

Pelaw.—Factory for the British Oxygen Co., Ltd.

Penistone (YORKSHIRE).—Houses (34), Silkstone; R.D.C. surveyor.

Plymouth.—Houses (63), Church Hill, Compton; W. A. Vercoe. Houses (134), Moor Lane; Taylor Woodrow Estates. Extensions to Astor Institute; Viscount Astor.

Pocklington (YORKSHIRE).—Houses (28), Market Weighton; R.D.C. surveyor.

Rawtenstall.—Houses (20), Edgside Lane; G. Clayton & Sons, Ltd. Houses (58), Hall Carr estate; borough engineer.

Reigate.—Houses (100); borough surveyor.

Seaton Valley.—Houses (1,340); U.D.C. surveyor.

Sheffield.—Extensions to works, Hawke Street; English Steel Corporation, Ltd. Houses (23), Fraser Road; T. A. Knowles & Sons, Ltd. Factory, Coleford Road; Cooper Bros.

Slough.—Electric lighting installations in houses, Langley; U.D.C. housing manager. Extensions to factory for Rheostatic Co., Ltd., Farnham Road.

South Norwood.—Cinema, Carrgreen Road, for the Odeon Theatres, Ltd.; H. W. Weedon, architect, Birmingham.

South Shields.—Houses (650), Little Horsley Hill (£227,800); borough engineer. Gymnasium and domestic science rooms, Girls' High school, for E.C.; H. Hill, architect, 10, Winchester Street.

Spilsby.—Houses (150), Sea Lane site; M. Malkinson, builder, Roman Bank, Ingoldmells.

Stirlingshire.—School, Drip Road, Stirling, for County E.C.; county architect, Stirling.

Sunderland.—Extensions to Bede Collegiate schools, for E.C. (£22,811); Randle & Co., builders, Bank Dunelm Street.

Surrey.—Police court house, Sutton, for C.C.; clerk, Kingston-on-Thames.

Uxbridge.—Cinema, for the Odeon Theatres, Ltd.

Wallasey.—Central school, Upper Brighton, for Wallasey E.C.

Ware.—Houses (32), Vinyard estate; R. W. Grantham, U.D.C. surveyor, the Priory.

West Riding.—Senior school, Penistone; County E.C.

Wimbledon.—Extensions to Wandle mills, for Connolly Bros. (Curriers), Ltd., 101, Chalton Street, London, N.W.1.

Worksop.—Shops and houses, Carlton Road, for the Worksop Co-operative Society, Ltd., Eastgate; Haslam, Son & Holleley, Ryton Chambers, Newcastle Avenue, Worksop.

York.—School, Derwent (£21,816); Birch & Sons, Ltd.

Yorkshire.—Additions to County school, Whitby, for C.C.; county architect, County Hall, Northallerton.

Keeping the Atmosphere Pure

How electricity is playing its part in reducing atmospheric pollution by smoke is shown at the Smoke Abatement Exhibition being held at the Science Museum, South Kensington, this month. Models and diagrams indicate the methods by which the discharge from the chimneys of a modern power station such as Battersea is made almost invisible and entirely innocuous, while at the distribution end is a model of a smokeless all-electric house. The advantages of air-conditioning plant are emphasised by an exhibit of a slab of dirt which, but for the apparatus, would have found its way into human lungs. Methods of measuring the density of smoke in a factory chimney and also Radiovisor smoke alarm equipment are demonstrated, and photographs point out the advantages of electricity for rail and road transport, space heating, cooking, water heating, and various industrial purposes such as steel melting and pottery firing.